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SEQUELAE TO COLD INJURY IN ONE HUNDRED PATIENTS

FOLLOW-UP STUDY FOUR YEARS AFTER OCCURRENCE OF COLD INJURY

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• *The status of hands and feet four years after injury by exposure to severe cold was studied in 100 soldiers evacuated from Korea in 1950 and 1951. Especially complete data, including a history, statement of symptoms, photographs of healed lesions, roentgenograms, circulatory measurements, and other physical findings were obtained from 89 patients. Subjective complaints and functional disturbances were more severe in winter than in summer and were generally more severe than would be expected from the physical appearance. The most frequent symptoms were excessive sweating, pain, cold feet, numbness, abnormal color, and abnormalities about the joints of the affected part. Cold injuries so severe as to cause limited areas of full-thickness necrosis of the skin were classed as of the third degree; the residua were generally scars with a punched-out appearance and characteristic deformities of the toenail. Fourth-degree frostbite, involving actual loss of tissue, produced much scarring, mutilation of terminal phalanges, and characteristic changes in the roentgenograms.*

About 5,600 victims of cold injury were evacuated from Korea during the winter of 1950-1951. Most of these patients were considered to have cases of frostbite rather than trench foot. A group of 100 of these patients, selected as a representative sample of the total number evacuated from Korea, form the basis for this study. Initial observations on these patients, which began an average of six days after the occurrence of their cold injury, consisted of clinical studies, physiological measurements, and x-ray examinations at frequent intervals up to 15 months after the injury. Early clinical findings are included in a report by Orr and Fainer.[1] The roentgenographic observations during the first 15 months after exposure to cold have been described by Vinson and one of us.[2]

The rather meager reports in the literature on the late sequelae of frostbite have prompted us to carry out additional studies on these same 100 patients four years after the occurrence of the cold injury. The availability of complete clinical records, serial photographs and roentgenograms, and research data concerning this group permitted an accurate evaluation of late symptoms and physical findings.

In the literature, physiological responses in mild chronic cases of trench foot have been studied by Burch and associates.[3] Simeone[4] has recently presented a preliminary report on cases of trench foot from World War II studied under the auspices of the Veterans Administration. Ellenhorn[5] has made observations on a group of military personnel who suffered cold injury either in World War II or in the Korean conflict.

Material and Methods

Throughout this study, cold injury has been classified into four degrees of severity: first degree involves only hyperemia and edema; second degree, hyperemia with vesicle formation; third degree, necrosis of the skin and subcutaneous tissue; and fourth degree, complete necrosis and loss of tissue.

The 100 patients with cold injuries on whom this report is based were young men. At the time of injury 85% were in the age group of 17 to 25 years. All were enlisted personnel, predominantly in the lowest three grades (private, private first class, and corporal). All patients, with two exceptions, were given a diagnosis of frostbite (table 1). The two patients who did not have frostbite had foot conditions (erythema, maceration, hyperhidrosis) of questionable relationship to exposure to cold. Such disabilities are referred to as

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"ill-defined condition of the feet." The data in table 1 concerning the severity of the lesions represent a ratio similar to that observed in the group of 5,600 victims of cold injury who were evacuated from Korea. Epidemiologic factors causing frostbite have been discussed by Schuman.[6]

TABLE 1.—*Site and Severity of Cold Injury Lesions in 100 Patients*

Site of Lesion	Frostbite, Degree of Severity 2	3	4	Ill-Defined Condition of Feet	Total
One foot	3	18	0	0	21
Both feet	4	47	15	2	68
Hands	0	0	3	...	3
Hands and feet	3	4	1	...	8
Total	10	69	19	2	100

We were successful in locating all 100 patients, and letters were written requesting their voluntary participation in the follow-up study. When a reply giving an affirmative answer was received, a medical history form and a questionnaire were mailed to each patient. The 97 former patients who returned completed forms were requested to report to the nearest Army or Veterans Administration hospital for physical examination, x-ray studies, and photographs. The medical and radiologic staffs of each hospital were provided with a complete clinical record of the patient together with instructions as to the observations desired. Of the group of 97 patients who replied, 89 reported to medical installations for the studies.

We were fortunate in being able to conduct personally examinations and studies on 50 of the patients; the remaining 39 were examined by members of the staffs of various other Army and Veterans Administration hospitals. Information was obtained from (1) x-ray examinations, (2) the medical histories and questionnaires, (3) physical examinations, (4) circulatory studies, and (5) photographs of healed lesions. Roentgenographic examination was completed first in order that "wet readings" might be made before dismissal of the patient to insure the adequacy of x-ray films obtained. All reports, physical findings, research data, photographs, and roentgenograms were collected in our laboratory for analysis and study.

Symptoms present four years after cold injury were determined on the basis of the history form, the questionnaire, and the detailed medical history obtained from the patient at the time of the physical examination.

The validity of information obtained from questionnaires may be questioned. However, three methods were employed to increase the accuracy of data derived from this source. 1. The forms contained questions about 18 possible symptoms, many asking the same thing in different phraseology, to serve as a "cross-check" on the accuracy of answers received. 2. When a questionnaire was returned with answers that did not correspond to the severity of the patient's lesion or to his previous medical history, a second, and sometimes a third, questionnaire was sent at intervals of several months. 3. The data on the questionnaire were carefully checked against clinical records and physical findings at the time of the examination of the patient. These procedures have greatly increased the accuracy of data obtained from medical histories.

The effect of cold injury on the subsequent disability and employment of the individuals affected is shown in table 2. In all degrees of injury there are some patients who received disability discharges, but the more severe the injury the greater the number of disability discharges and percentage of disability allowed. The 18 patients with fourth-degree injuries, including 3 with injuries of the hand and 15 with injuries of the feet, received disability ratings. However, two of these patients have remained on active duty with the Army. Of the 97 former patients, 91 are gainfully employed, but more than half of them complain that they are handicapped by the residual effects of cold injury either in obtaining employment or in carrying out their particular job.

Symptomatology

The six most common symptoms of these former patients are listed in table 3. One significant fact is that all symptoms, with the exception of excessive sweating, were much more severe during the winter months than during the summer months. The pain and cold feet experienced in cold weather were the most bitter complaints expressed by the patients with frostbite four years after their injury. Several of them stated that they were unable to accept employment outdoors during winter months. One patient reported that he had moved to a warmer climate to obtain relief from these symptoms. Both stiff joints and pain in the joints are listed in table 3 as symptoms in the joints, since patients usually complain of both together. There was very little correlation between symptoms in the joints and roentgenographic or physical findings of joint pathology.

Those patients who complained of excessive sweating during summer months had the additional problem of controlling fungus infections of the feet. In addition to the hyperhidrosis, injured skin and impaired circulation may have added to the difficulty of fungus control. Three of the patients with fourth-degree cold injury had lumbar sympathectomies performed for relief of symptoms, primarily pain, cold feet, and excessive sweating. All claimed that considerable relief from symptoms was obtained by the operative procedure.

TABLE 2.—*Disability and Employment Status of Patients Four Years After Occurrence of Cold Injury*

Degree of Severity	Patients, No.	Disability Discharge Yes	Disability Discharge No	Employed Yes	Employed No	Handicapped Yes	Handicapped No
Second	10	2	8	10	0	5	5
Third	67	18	49	63	4	37	30
Fourth	18	16	2	16	2	12	6
Ill-defined condition	2	1	1	2	0	2	0
Total	97	37	60	91	6	56	41

Clinical Observations

The report on clinical observations will be restricted to those 50 patients examined and studied personally by us. In this manner uniformity in examination and in collection of data is assured. The first impression a physician obtains in examining these patients four years after their cold injury is that all symptoms are more severe than organic physical findings would indicate. It is difficult to determine to what degree these complaints may have a psychogenic basis, particularly since monetary compensation from the Veterans Administration may also be involved. For example, patients who experienced first-degree or second-degree frostbite in 1951 frequently complain of many symptoms (pain, excessive sweating, cold feet, paresthesia), but rarely can any physical evidence of their previous injury be detected. Such is not true in cases of third-degree and fourth-degree frostbite. In these cases residual pathology could always be detected four years after the injury. The most common physical findings are shown in table 4.

Tissue loss does not occur in second-degree cold injury. In cases of third-degree injury the tissue loss reported is really a tissue defect. It is not loss of a part, but rather a "punched-out" area resulting from sloughing of the overlying eschar and subsequent granulation of the lesion. Of course, tissue loss occurs in all fourth-degree cold injuries. Scars are absent in patients with ill-defined condition of the feet and could not be detected in any patients with second-degree frostbite. Scars are usually present at the site of injury in cases of third-degree injury and are always quite extensive in cases of fourth-degree cold injury.

One of the most characteristic physical findings four years after frostbite is that of abnormal toenails. In more than two-thirds of the cases in which the injury is severe enough to involve full-skin thickness (third degree of severity), the nails are abnormal. They are markedly thickened, heavily ridged, and contracted at the front margin. Often the nail beds have an abnormal cyanotic appearance. In table 4 four cases of fourth-degree injury are listed as 100% because only four patients with injuries of such severity had nails remaining for examination, and all showed pathology. No abnormalities of the nails were observed in cold injuries of less than third-degree severity.

The determination of hyperhidrosis or excessive sweating was qualitative. Both feet of the patient were dried with a towel. Ten minutes later the feet were palpated to determine presence of moisture on the skin surface. The feet of normal individuals will feel slightly moist after 10 minutes of exposure at room temperature. In many of these patients the feet were quite wet after 10 minutes had elapsed. One question that cannot be answered is whether the excessive sweating is a cause or effect of cold injury. Certainly a hyperhidrotic person is a likely candidate for cold injury, and hyperhidrosis may have been present before the frostbite occurred and have been a major factor in causing it.

TABLE 3.—*Symptoms of Ninety-seven Patients Four Years After Occurrence of Cold Injury*

	Degree of Severity											
	2				3				4			
	Summer		Winter		Summer		Winter		Summer		Winter	
Symptoms	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Cold feet	0	0	8	80	19	28	55	83	3	20	10	67
Pain	3	30	7	70	29	43	46	69	10	67	12	80
Excessive sweating	8	80	8	80	54	81	33	49	11	74	8	54
Numbness	2	20	7	70	20	30	49	74	7	47	10	67
Abnormal color	2	20	4	40	22	33	43	65	7	47	7	47
Symptoms in joints	1	10	4	40	17	26	26	39	5	33	7	47

The finding of abnormal color has a different meanin the white patient as compared to the Negro patient. In white patients abnormal color was primarily an erythrocyanotic appearance, probably associated with peripheral circulatory disturbance. This was present in only 3 of 28 white patients examined. In the Negro patient abnormal color was caused by skin depigmentation, which occurred in all Negroes with third-degree or fourth-degree frostbite. In appearance this depigmentation bears a striking resemblance to that observed in Negroes after skin burns.

The incidence of stiff joints, as evidenced by at least 50% loss of movement, is well below the frequency of symptoms in the joints but greater than that of the joint pathology shown by roentgenograms. Damage to the joints was more frequent and more extensive in the patients with more severe cold injury. In fourth-degree frostbite some of the stiffness of the joints may be due to heavy, contracted scar tissue surrounding the joint rather than pathology within the joint itself. In patients with pathological findings in the joints of previously frostbitten extremities, there was no evidence of arthritic changes or changes in the joints elsewhere in the body.

TABLE 4.—*Physical Findings in Fifty Patients Four Years After Occurrence of Cold Injury*

	Degree of Severity						Ill-defined Condition of Feet	
	2		3		4			
Physical Findings	No.	%	No.	%	No.	%	No.	%
Tissue loss	0	0	23	66	9	100	0	0
Scars	0	0	32	91	9	100	0	0
Abnormal nails	0	0	25	71	4	100	0	0
Hyperhidrosis	3	75	12	34	5	56	1	50
Abnormal color	2	50	14	40	7	78	1	50
Stiff joints	1	25	7	20	6	86	0	0

Roentgenographic Studies

All of the patients had early roentgenographic examinations; the shortest interval between exposure to cold and x-ray examination was 9 days, and the longest

was 110 days. No changes in the bone were seen immediately after the frostbite. There was transient occurrence of osteoporosis in a fairly large percentage of the soldiers with cold injuries during the first few months. It was usually mild or moderate in intensity. The presence of osteoporosis may have been due to inactivity rather than to the low temperature. Mutilation of the terminal phalanges could usually be traced to the loss of the overlying soft tissues, exposure to air, and subsequent surgical removal of the exposed fragment. The most interesting roentgenographic changes were small punched-out defects, either of the surfaces of the joints or close to the surfaces of the joints of the hands and feet of seven of the patients. Only a few reports of similar changes are available in the literature, usually concerning individual cases.[7] The desire to study further the course of these juxta-articular changes in the bone was one of the main reasons for this four-year follow-up study.

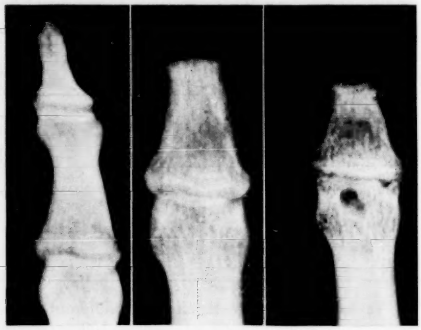

Fig. 1.—Roentgenograms showing juxta-articular changes in fifth finger of right hand after fourth-degree cold injury: *(left)* no abnormality two months after cold injury, *(center)* questionable early defect of the head of the proximal phalanx six months after injury (the terminal phalanx has been amputated), and *(right)* definite defect in the joint and cyst-like juxta-articular defect four years after injury. Changes were also present in two other interphalangeal joints of the same hand. Note the coarsening of the trabeculation seen on the last roentgenogram.

TABLE 5.—*Frequency of Changes in Joints of Toes and Fingers After Cold Injury*

Toe No.	Frequency of Involvement	Finger No.	Frequency of Involvement
1*	6	1†	0
2	6	2	2
3	5	3	1
4	7	4	3
5	16	5	5

* The big toe.
† The thumb.

We were fortunate to obtain roentgenographic studies in 89 of the original 100 patients four years after occurrence of cold injury. None of them showed late occurrence of osteoporosis. Trabecular changes, which were noted in a few of the four-year films, consisted of coarsening of the trabeculae as seen in patients with changed statics. Changes were recognizable in 12 of the cases but were marked in only 5 of them. It is of interest that four of these five patients had had amputation of one or more phalanges of the involved hands or feet.

Terminal phalangeal defects were found more frequently in the follow-up studies than they had been in earlier x-ray examinations, largely because some of the patients had had a rather short follow-up and had lost phalanges in the months after the earlier observation. It was impossible to trace the exact course of all the soldiers with these partially mutilated terminal phalanges, but, in those in whom a complete follow-up was possible, it appeared that a loss of overlying soft tissue and exposure to air caused mutilation. There was no convincing evidence that cold injury itself had caused mutilation of bone without loss of the overlying soft tissue.

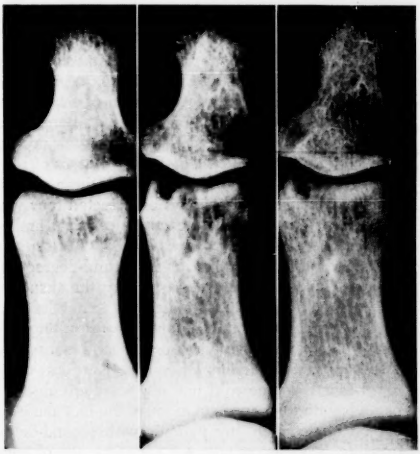

Fig. 2.—Roentgenograms showing juxta-articular changes in right great toe caused by third-degree cold injury: *(left)* no joint change three months after cold injury, *(center)* definite defect of the joint surface 12 months after cold injury, and *(right)* partial healing-in of defect four years after cold injury.

Changes in Joints.—Of particular interest were the punched-out defects of the surfaces of the joints of toes and fingers (fig. 1). The number of cases in which such changes occurred had increased to 19 from the original 7. This was partially due to the fact that in repeated studies of the films very small lesions in the joints were discovered that had been missed at the original review. There were also patients who showed defects only on the late follow-up films. In 12 of the soldiers, the changes in the joints were visible within the first 12 months after frostbite, starting as early as the 5th month in some. In the remaining seven soldiers there was inadequate opportunity to demonstrate early

lesions of the joints, since their last roentgenograms prior to the four-year follow-up had been taken within the first three months in five, and within the first eight months in the other two. It appears that these changes in the joints usually occur between 5 and 12 months after frostbite. Changes were seen in the joints of the feet of 15 patients and in the joints of the hands of 3. In addition, one patient had changes in the joints of one hand and one foot. The fifth toe was more frequently involved than the big toe (table 5). This is of interest since in most cases of frostbite observed clinically the big toe is more commonly affected. Of those patients in whom a four-year follow-up of changes in the joints was possible, a greater number showed an increased density surrounding the punched-out defect near the joint, with partial or complete healing (fig. 2). A few lesions had slightly increased in extent, and in two cases some of the lesions had improved while additional new lesions had occurred.

Changes were found only in the joints of extremities that had been frostbitten. An exact comparison between the degree of frostbite and the occurrence of lesions of the joint was not possible. Many phalanges of patients with third-degree frostbite did not show changes in the joints. On the other hand, some of the lesions of the joints occurred in digits that had only second-degree and occasionally only first-degree frostbite. In this respect, the previously mentioned discrepancy between clinical and roentgenographic involvements of first and fifth toes is of interest.

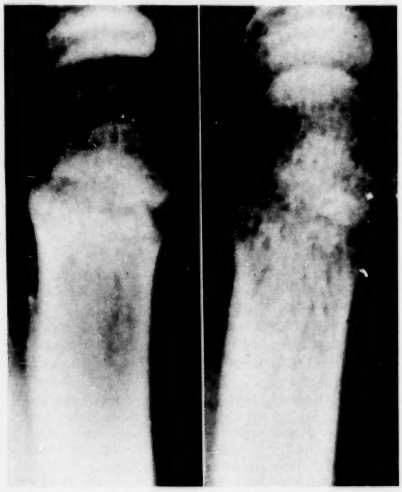

Fig. 3.—Roentgenograms showing periosteal new bone formation of fifth metatarsal after cold injury: *(left)* marked periosteal new bone formation nine weeks after cold injury and *(right)* disappearance of periosteal new bone formation 13 weeks after cold injury.

We have no histological studies of these changes in the joints. It is likely that they represent subchondral defects filled probably with granulation tissue. The various possibilities of their pathogenesis cannot be discussed in detail. Damage caused by vascular changes appears to be the most tempting explanation.

Fig. 4.—Roentgenograms showing late deformity of head of fifth metatarsal after early periostitis close to the epiphyseal plate in the same patient whose early roentgenograms appear in figure 3: *(left)* deformity of the head of the fifth metatarsal four years after cold injury and *(right)* for comparison, the head of the normal fifth metatarsal of the opposite foot.

Periosteal new bone formation, which is frequently encountered in frostbite produced experimentally,[8] was seen in only 2 of the 100 patients. In both it occurred within the first two months, and healed without visible residue. Almost all the soldiers were at an age where the epiphyses were closed; for this reason the group did not show advanced disturbances of growth, which cold injury may produce.[9] In one 17-year-old soldier, however, with early periosteal new bone formation near the open epiphysis of the fifth metatarsal, the cold injury resulted in a deformity of the head of the bone four years later, apparently caused by the effect on the growing cartilage (fig. 3 and 4).

Comment

The fact that more than 100,000 United States troops suffered cold injuries during World War II and in Korea emphasizes that sequelae to cold injury may be a medical problem of considerable magnitude for civilian, Veterans Administration, and military physicians alike. In addition to treating these sequelae, the Veterans Administration physician and the military medical officer must evaluate the severity of any

residual pathology for purposes of compensation of veterans and duty assignments of military personnel. Also the physician may frequently be faced with the problem of separating malingerers from individuals who have actually suffered cold injuries previously. Even in personnel who have experienced only a moderate degree of cold injury the symptoms appear much greater than warranted by any residual pathology that may be detected. Although many of these complaints may be of psychogenic origin, it is our opinion that the majority are bona fide disturbances and are discomforting to the patient.

Thus, the question arises as to what physical findings are present in the patient with cold injury four years after the injury. In first-degree and second-degree injury there are almost none. Healing is usually so complete that physical examination can rarely detect any area suggestive of the original lesion due to cold injury.

However, when cold injury is of full-skin thickness (third or fourth degree of severity), certain findings become evident and relatively constant: (1) an area of scar formation and skin thickening; (2) abnormal condition of the nail; (3) tissue deficit or actual tissue loss in fourth-degree injuries; (4) color changes, especially depigmentation in Negro patients; (5) joint pathology, demonstrable by physical examination and roentgenograms; and (6) growth disturbance when cold injury occurs before closure of the epiphyses. The presence of one or more of the above conditions will help validate an individual's claim to previous cold injury.

Fig. 5.—Photograph of feet of Negro patient taken four years after cold injury, showing tissue loss and deformity of left foot, abnormal nails of both large toes, and depigmentation of skin in areas of cold injury.

Many of these conditions are demonstrated in figure 5, a photograph taken four years after occurrence of cold injury. This Negro patient had fourth-degree frostbite of the left foot and third-degree frostbite of the right. In the left foot the tissue loss, depigmentation, heavy scarring, and marked deformity are obvious. However, in the right foot there is no tissue loss but marked depigmentation over the previously injured areas. Both large toenails are thickened, heavily ridged, and abnormal in appearance. The two remaining toes on the left foot were totally immobile, and joint pathology was confirmed by x-ray examination.

Summary

One hundred patients with cold injury, a representative sampling of the 5,600 cold-injury casualties evacuated from Korea during the winter of 1950-1951, have been studied four years after injury by means of medical histories, physical examinations, serial roentgenograms, and photographs.

Symptoms after frostbite, in order of frequency, are excessive sweating, pain, cold feet, numbness, abnormal color, and symptoms in the joints. Characteristic physical findings are tissue loss and scarring, abnormal nails, discoloration and depigmentation, hyperhidrosis, and joint abnormalities. Roentgenographic changes in these soldiers include early transient osteoporosis, mutilation of terminal phalanges, cyst-like defects of the bone near the joint surfaces of fingers and toes, early transient periosteal new bone formation, and growth disturbance in patients with open epiphyses.

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Figures 1 through 4 were supplied by the Armed Forces Institute of Pathology, Walter Reed Army Medical Center, Washington, D. C.

References

1. Orr, K. D., and Fainer, D. C.: Cold Injuries in Korea During Winter of 1950-51, Medicine **31**:177-220 (May) 1952.

2. Vinson, H. A., and Schatzki, R.: Roentgenologic Bone Changes Encountered in Frostbite, Korea 1950-51, Radiology **63**:685-695 (Nov.) 1954.

3. Burch, G. E.; Myers, H. L.; Porter, R. R.; and Schaffer, N.: Objective Studies of Some Physiologic Responses in Mild Chronic Trench Foot, Bull. Johns Hopkins Hosp. **80**:1-70 (Jan.) 1947.

4. Simeone, F. A.: Follow-up Studies on Trench Foot from World War II, Cold Injury: Transactions of the Fourth Conference, edited by M. I. Ferrer, New York, Josiah Macy, Jr. Foundation, 1955, to be published.

5. Ellenhorn, M. J.: Post-frostbite Sequelae: Clinical and Experimental Study, Report 130, Army Medical Research Laboratory, Fort Knox, Ky., Dec., 1953, pp. 1-31.

6. Schuman, L. M.: Epidemiology of Cold Injury in Man, in Cold Injury: Transactions of the Second Conference, edited by M. I. Ferrer, New York, Josiah Macy, Jr. Foundation, 1952, pp. 11-84.

7. Lohr, W.: Die Verschiedenheit der Auswirkung gleichartiger bekannter Schäden auf den Knochen Jugendlicher und Erwachsener, gezeigt an Epiphysenstörungen nach Erfrierungen und bei der Hämophilie, Zentralbl. Chir. **57**:898-909 (April 12) 1930. von Tempsky, A.: Gelenkschädigung durch Erfrierung, ibid. **58**:339-343 (Feb. 7) 1931. Oehlecker, F.: Die Sudecksche Krankheit, insbesondere nach Erfrierungen, Chirurg **14**:422-428 (July 15) 1942; ibid. 459-472 (Aug. 1) 1942. Ruckensteiner, E.: Erwägungen zum Röntgenbild örtlicher Erfrierungen, Zentralbl. Chir. **72**:163-171, 1947.

8. Blair, J. R.; Kulka, J. P.; and Schatzki, R.: Experimental Cold Injury, in Cold Injury: Transactions of the Fourth Conference, edited by M. I. Ferrer, New York, Josiah Macy, Jr. Foundation, 1955, to be published.

9. Dreyfuss, J. R., and Glimcher, M. J.: Epiphyseal Injury Following Frostbite, New England J. Med. **253**:1065-1068 (Dec. 15) 1955.

CARDIOVASCULAR EFFECTS OF BREATHING AGAINST UNBALANCED ATMOSPHERIC PRESSURES

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• The effects of applying unbalanced pressures to the head and body were studied in 56 airplane pilots. The head and upper airways of a given subject were exposed to varying pressures within a full-head pressure helmet while the trunk and extremities were exposed to independently adjustable pressures in a separate compartment. Both compartments contained 100% oxygen. When the pressure on trunk and extremities was reduced to that equivalent to an altitude of 40,000 ft. (12,200 m.), marked differences were found among the subjects as to their ability to maintain a normal pulse rate, normal electrocardiogram, and consciousness in the face of increasing difference of pressure between the two compartments. No significant relationship was found, however, between this ability and the results of physical fitness tests or anthropological groupings. The data suggested that unbalanced pressures acting upon the lungs reduce the efficiency of the coronary circulation and cause myocardial hypoxia.

The breathing of 100% oxygen under pressure can at times be a military necessity. At 40,000 ft., in the absence of a pressurized cabin, breathing 100% oxygen is comparable to breathing free air at 10,000 ft., which results in a condition, usually not hazardous, of mild deficiency in blood oxygen saturation. Above 40,000 ft., the atmospheric pressure is inadequate even in the presence of 100% oxygen to present sufficient partial pressure of oxygen to the lungs. Therefore, exogenous pressure must be added to the breathing system to guarantee proper oxygenation of the blood. It is the purpose of this preliminary report to point out some of the cardiovascular effects of continued imbalance, several reaction types observed, and modification of these effects by variation in atmospheric pressure. The possible etiology of the electrocardiographic changes observed will also be discussed.

Methods

Fifty-six healthy young men, aged 24 to 38, were studied. All were pilots experienced in flying at high altitudes. Prior to his participation in the study, each subject received an extensive physical examination supplemented by an electrocardiogram taken after a Master tolerance test, a chest x-ray, and complete blood and urine analyses.

For the purpose of this investigation, a special pressure-differential tank was constructed (fig. 1). The subject was seated in the apparatus with his head protruding through a port in the upper surface of the tank proper; the head was pressurized by means of a U. S. Air Force full-head pressure helmet, which was fastened securely to the surface of the tank. This effectively places the subject's head and pulmonary tree in one "compartment" and the rest of the body in another. The compartments were separated by a special pressure seal, which did not compromise the areas of the neck that are sensitive to pressure. The upper three-quarters of the neck was pressurized by helmet pressure, and the lower quarter by tank pressures. Each compartment was pressurized with 100% oxygen; Air Force full-head pressure helmets utilize 100% oxygen. The tank was pressurized with oxygen against the possibility of leakage from tank to helmet in experiments where the excess of pressure was on the body. This apparatus allowed any degree of imbalance to be created and maintained. It was operated at ground level and at simulated high altitudes produced with reduced ambient pressures in vacuum chambers. For the purposes of this paper, the discussion will be confined to the effects of increased airway pressures less than 20 mm. Hg in magnitude, except where mention of other studies is pertinent.

There were two variations of this study. In one, the subject was placed in the pressure-differential tank and pressure was added to both the tank and the helmet. The effect was to raise the atmospheric pressure around the man. At ground level at the site of experimentation, atmospheric pressure was 740 mm. Hg. By adding 160 mm. Hg of pressure to both the compartments of the apparatus, the atmospheric pressure around the subject was increased. At this point an imbalance was created by adding an additional 15 to 20 mm. Hg of pressure to the helmet. Later, this same subject, having remained in the tank, would be taken to a simulated altitude of 20,000 ft. where the same degree of imbalance would again be created. On each occasion, the subject's physical orientation with the apparatus remained the same and the degree of imbalance imposed was the same. Since he was consuming plethoric amounts of oxygen under each circumstance, the blood oxygen saturation is assumed to remain the same. The only real variable was the relationship of the imbalance to the surrounding atmospheric pressure. At ground level, the ambient pressure was raised to 900 mm. Hg; at 20,000 ft., it was lowered to 350 mm. Hg.

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In the second variation of this study, the subject was observed first at ground level and then in the vacuum chambers, where he was kept at an equivalent of 40,000 ft. Here the ambient pressure was dropped to 141 mm. Hg. Other variables enter this portion of the study in that 100% oxygen at this altitude supplies only the amount of oxygen that would be available at 10,000 ft. on free air, and not the plethoric amount available at lower altitudes, and also in that problems of altitude dysbarism may arise.

In most of the studies that involved pressure breathing, the expansion of the chest and abdomen was restricted by an adjustable restraining garment, which was inelastic and prevented overdistention of the chest. If the chest were allowed to expand, part of the increased airway pressure would be dissipated in overcoming the elastic recoil of the chest. Uncontrolled chest expansion also would reflect itself in lower venous pressure and increased pulmonary reflex activity. A restraining garment allowed greater respiratory ease too, because expiratory muscles never relax under conditions of potential overinflation of the chest. With the lower pressures being reported here, however, the vest was less important.

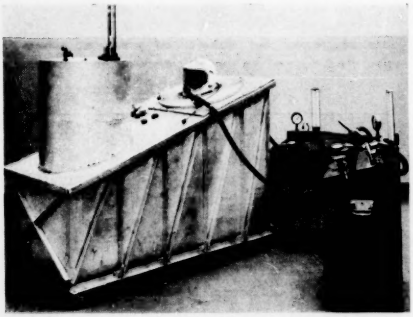

Fig. 1.—Photograph of pressure-differential tank used to study the cardiovascular effects of pressure breathing.

A large portion of the subjects reported were studied only briefly at ground level before being taken to the 40,000-ft. equivalent, since it was at this altitude that the cardiovascular responses were most easily evoked. In those subjects who underwent large variations in ambient pressure, the order of the two portions of the experiment was sometimes reversed so that the response at reduced atmospheric pressures would not be influenced by previous change at higher atmospheric pressures. Ascent to high altitudes was preceded by adequate denitrogenation.

Electrocardiographic tracings were accomplished with a Sanborn Poly-Viso, which allows simultaneous recordings of four leads. The leads used in this investigation were the standard limb leads, the augmented unipolar limb leads, and precordial leads V_1, V_2, V_4 and V_6. Vectorcardiography, using the tetrahedron reference frame, was done with a Sanborn vectorcardiography system. Blood pressures were recorded according to the method of Zuidema, Edelberg, and Salzman,[1] which utilizes a strain gauge placed over the brachial artery beneath the blood-pressure cuff with amplification of the electrical signal and condenser blockage of the direct-current component.

All electronic systems involved were kept at ground-level pressurization to guarantee their proper function and were connected to the subject, through the vacuum-chamber wall, with shielded cables. The cardiac-output method, to which there is a brief allusion, utilizes small amounts of short half-life radioactive isotope, as in the method of Zipf and coworkers.[2] This method allows multiple determinations and yields a high degree of reproducibility.

Results

Respiratory changes caused by increased pressure can be summarized for purposes of this article with the following comments. The vital capacity is altered in that the expiratory reserve is augmented at the expense of the inspiratory reserve; residual air is increased, especially above 20 mm. Hg; the respiratory cycle is reversed, inspiration becoming passive and expiration becoming active; and respiratory work is increased. These respiratory changes have been rather extensively investigated in the past by Fenn, Otis, and Rahn.[3]

Changes in Blood Pressure.—When a subject breathes under pressure, an elevation of blood pressure is observed. Several authors have noted this, commenting that the elevation is always less than the increase in breathing pressure. But, if the breathing pressure and counterpressure on the rest of the body are both raised equally, the increase equals the elevation in the basic blood pressure. For example, a subject whose normal blood pressure is 120/80 mm. Hg will show an apparent pressure of 300/260 mm. Hg if 180 mm. Hg of pressure is added, provided breathing pressure and counterpressure are balanced. If the balance of pressure is disturbed in favor of the breathing pressure, the apparent rise in the blood pressure is less than the added breathing pressure. (Ophthalmoscopic examination is unsatisfactory when the subject's whole head is encased; present plans call for retinal photography, with an altered helmet facepiece.)

One must keep in mind the proper frame of reference for the blood pressure. At ground level, the blood pressure is judged in reference to the open air. If breathing pressure is used as the unit of reference, the blood pressure remains unaltered in a balanced situation, and actually falls in a situation of imbalance. If a subject is placed in a vacuum chamber, with his blood pressure judged in reference to the ambient air outside the chamber, atmospheric pressure inside the chamber has but to drop a few millimeters more than the subject's systolic pressure before the manometer on the outside of the chamber ceases to register any pressure at all. We are certain that the hypertension of pressure breathing is apparent rather than real and is, in situations of positive intrathoracic imbalance, actually a relative hypotension.

Electrocardiographic and Vectorcardiographic Changes.—Electrocardiographic findings are essentially the most sensitive and most easily obtained index

of cardiac dysfunction or injury currently available. The techniques of vectorcardiography were used here primarily as evidence to confirm electrocardiographic changes. Generally speaking, the changes were predominantly those of depression of the S-T segment and of reduced amplitude, diphasicity, or inversion of previously positive T waves in key leads. The QRS complex was sometimes seen to be altered by the production of step-like conduction defects or, quite commonly, by slurring of previously angular complexes. Generalized loss of amplitude of the entire electrocardiogram was frequently observed. Widened notched P waves developed on rare occasions. All these changes disappeared almost immediately when pressures were equalized, even at the 40,000-ft. equivalent where the delivered oxygen supply left a mild deficiency in blood oxygen saturation.

Most changes, including early ST-segment and T-wave changes, were disconcerting in that they could be interpreted clinically as within normal limits for the most part; nevertheless they could be made to appear and disappear in subjects whose cardiac status had been carefully evaluated prior to the altitude-chamber tests. With QRS-conduction changes, the P-R interval remained within normal limits.

The S-T-segment and T-wave changes that can be induced fulfill all the requirements of Levy or Masters and are most suggestive of myocardial hypoxia. Although right-axis deviation will occur with an imbalance of this sort, the vectorcardiographic evidence belies positional change as a complete explanation, as does careful analysis of simultaneous electrocardiographic leads. Induced electrolyte change has been investigated as a possible explanation and has been found wanting; it is particularly difficult to justify in cases of immediate change with imbalance.

Anxiety as an etiological factor must be considered, especially in those subjects in whom the changes were immediate with imbalance. However, altitude tests on the majority of subjects were terminated "for electrocardiographic reasons," after the subjects had been under imbalance for some time and could detect no change in their physical situation from the time of original physical and psychological readjustment. This was especially true of those under lesser degrees of imbalance. All had had some minimal experience with pressure breathing before experimentation. The more anxious individuals revealed anxiety when base-line tracings were taken immediately before the experiment and during the early balanced phase.

Systemic hypoxia must be eliminated as an explanation of electrocardiographic disturbances. However, it should be remembered that plethoric amounts of oxygen are being supplied in most cases. Also, immediate and severe changes take place in the more sensitive subjects. If systemic hypoxia is at fault, the cause must be circulatory. Early oximetry was unsatisfactory in this group, for technical reasons, and is being repeated. The oxygen–carbon dioxide ratio does not appear to be sufficient cause for concern; there is roughly a 90% exchange of the dead-air space in the helmet with each respiratory cycle. Hyperventilation has been largely discounted as a cause.

Aside from such possibilities as the spastic constriction of coronary arteries, which in recent years has begun to be questioned as a significant or effective mechanism, one should consider the capability of the coronary system, or, as might be suggested by Raab's work,[4] wasteful myocardial oxygen consumption induced by the catecholamines.

However, we should like to suggest the following possible mechanism. As in the Valsalva experiment,[5] pressure breathing causes increased pulmonary resistance, peripheral venous pooling, elevated venous pressure, increased right auricular and ventricular pressures, and decreased cardiac output. As explained earlier, we believe that a state of relative hypotension exists in the unbalanced pressure-breathing situation. The coronary arteries originate at the base of the aorta and empty largely into the coronary sinus of the right auricle. The thebesian vessels and arteriolar sinusoids open primarily into the right ventricle. If a state of relative systemic hypotension exists and if pressures on the right side of the heart are raised, then the coronary or myocardial gradient has been compromised. A tachycardia exists because of the reduction of effective circulating volume caused by venous pooling and for several other reasons. Sarnoff's work [6] with his unique heart preparation indicates that the heart pays a heavier price in oxygen consumption for increasing cardiac output by an increased number of contractions rather than by increasing the stroke volume. In the pressure-breathing situation, then, we are faced with possible decrease of pressure gradient across the coronary system in the face of increased myocardial demands and, at 40,000 ft., decreased oxygen. As opposed to the situation in conditions such as pulmonary stenosis, blood is blocked outside the thorax and is not as available to the right side of the heart; the heart is thus less able to compensate. Myocardial hypoxia is the logical result.

Blood Pressure, Pulse Rate, and Pulse Pressure.—All 56 subjects were eventually taken to the 40,000-ft. equivalent for periods of imbalance. Their performances were divided into categories on the basis of the length of time of each performance for a given imbalance. An analysis of the blood pressure, pulse rate, and pulse pressure of the 20 subjects who were placed in each of the long-performance and short-performance categories is shown in the table. An interesting trend should be noted. The average initial blood pressure of the group undergoing pressure for a long time is appreciably higher than that of the group undergoing it for a short time, although initial pulse rate and pulse pressure findings were the same. When the subjects were taken to the 40,000-ft. equivalent, several interesting findings separate the two groups. The blood pressure fell in 50% of the short-performance group as opposed to 26% of the long-performance group; pulse rate decreased in 22% of the short-performance group while it remained the same or increased in 100% of the long-performance group; pulse pressure fell in 57% of the short-performance group while remaining the same or climbing in 100% of the long-performance group. Similarly, during the course of pressure breathing, while neither pulse rate nor pulse pressure of the long-performance group ever fell after the original

adjustment, the pulse rate decrease in 13% and the pulse pressure fell in 36% of the short-performance group. Similar parallels can be found in other portions of the table.

Since the 40,000-ft. equivalent represents a mild deficiency of blood oxygen saturation, it appeared to us that the response of the subjects in the short-performance group even before pressure breathing reflected

Changes in Blood Pressure, Pulse Rates, and Pulse Pressure of Forty Subjects Due to Variations in Pressure Breathing

Blood Pressure	Short-Performance Group,* 20 Subjects	Long-Performance Group,* 20 Subjects	Pressure
Ground level, mm. Hg	143/78	151/88	
40,000 ft. equivalent, no imbalance, %	50	60	increase
	0	13	unchanged
	50	26	decrease
Beginning of imbalance period, %	5	21	increase
	11	11	unchanged
	84	68	decrease
Course, during imbalance, %	0	5	increase
	67	84	unchanged
	33	11	decrease
Pulse rate			
Ground level, beats per minute	86	86	
40,000 ft. equivalent, no imbalance, %	68	61	increase
	10	39	unchanged
	22	0	decrease
Beginning of imbalance period, %	68	90	increase
	10	10	unchanged
	22	0	decrease
Course, during imbalance, %	36	35	increase
	52	65	unchanged
	13	0	decrease
Pulse pressure			
Ground level, mm. Hg	70	68	
40,000 ft. equivalent, no imbalance, %	31	42	increase
	12	58	unchanged
	57	0	decrease
Beginning of imbalance period, %	50	42	increase
	14	21	unchanged
	36	37	decrease
Course, during imbalance, %	0	32	increase
	64	68	unchanged
	36	0	decrease

* Groups determined by length of time the subjects underwent imbalance

their inability to compensate for cardiovascular stress as well as the subjects in the long-performance group.

Termination of Experiment.—Criteria for termination of the experiment fell generally into three groups: electrocardiographic changes, uncontrolled increase in pulse rate, or impending syncope. Electrocardiographic changes, either incipient or acute at onset, accounted for the vast majority of terminations. Rapidity of onset and severity of change varied remarkably from individual to individual for the same degree of pressure breathing, depending upon the surrounding atmospheric pressure. In some, acute changes were immediate; in others, they developed gradually or minimally over periods longer than an hour.

About 6% of the subjects, when exposed to imbalance at the 40,000-ft. equivalent, sustained rapid increases in pulse rate. Within a minute or two the pulse would climb past 160 beats per minute. At rates between 160 to 180 beats a minute, the minute volume of the heart ceases to increase with the rate of the pulse. Above 180 beats a minute, for the average human, minute volume falls off sharply, because the heart is unable to fill adequately between contractions. Rise of pulse rate to 160 beats a minute was regarded as a signal for termination. If the increase in pulse rate is ignored or incipient electrocardiographic changes are allowed to progress, a vasovagal syncope will ensue.

Recovery from all these disturbances of normal function was virtually immediate when the pressures were equalized, although those who had vasovagal disturbances appeared pale, had a relative bradycardia, and felt weak for several minutes.

Effect of Variations in Ambient Pressure.—In all cases, it was demonstrated that the degree of positive-pressure breathing is important, as is its relationship with the surrounding or ambient pressures. That is, the absolute difference between the two compartments in the pressure-differential tank is very important, and the ratio of that difference to the total ambient pressure is also quite important. For example, an imbalance of 20 mm. Hg at an ambient pressure of 900 mm. Hg represents a ratio of disproportion of 20/900, or 1/45, while at an ambient pressure of 200 mm. Hg it represents a ratio of 20/200, or 1/10. Although the improvement varied with the individual, a doubling of the atmospheric pressure, or ambient pressure, under a

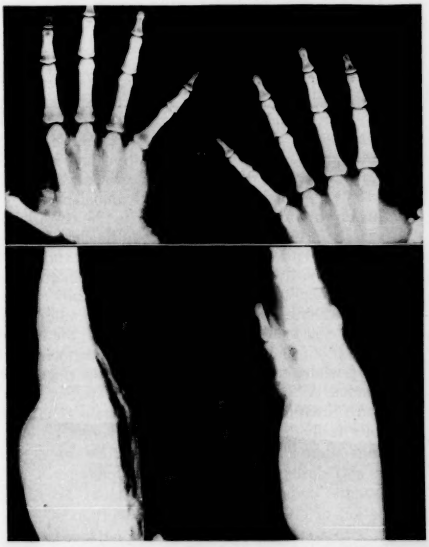

Fig. 2.—Roentgenograms taken of hands at equivalent elevation of 85,000 ft. (*left*) and at ground level (*right*). Note the subcutaneous emphysema and the gaseous outlining of the metacarpophalangeal joints.

moderate degree of pressure breathing could mean a doubling of the time-duration element. True "pulse climbers," seen only at the 40,000-ft. equivalent in the group considered here, did not exhibit this type of activity, although they remained in the short-performance group, if either the pressure breathing were

reduced in degree or the ambient pressure greatly increased while the same absolute imbalance was retained.

A single subject can serve as an example of this phenomenon. This subject, an accomplished pressure breather, had a resting cardiac output of 7.7 liters per minute at ground level and an arm-to-heart circulation time of 5.5 seconds, both determined with isotopes. With an additional 140 mm. Hg of pressure in the tank and 180 mm. Hg in the helmet, his circulation time increased to 7.5 seconds and his cardiac output dropped. When he was taken to 20,000 ft. with the tank open to ambient pressures and 40 mm. Hg of pressure in the helmet, the circulation time increased to 15.5 seconds and the cardiac output dropped still further. In each situation sufficient time was allowed for the subject to "equalize" at the level of imbalance and sufficient time was allowed between the brief exposures.

Age, Physique, and Physical Fitness.—Ages of the subjects varied from 24 to 38. Physiques were divided into three anthropological groupings and physical fitness was subdivided into five classes, from poor to excellent. There was no significant relationship between any of these variables and performance during the test.

Cold Pressor Test.—Six of the subjects were tested with a modified cold pressor test. Greater pulse and pulse pressure response was seen in those who did well in the pressure tests, but the number is considered too small to be significant.

Unprotected Areas.—Studies of body-fluid disposition during pressure breathing are currently under way with isotope techniques. Unprotected areas of the body are subject first to venous congestion and then to edema if the imbalance is continued long enough. If pressure breathing is done at extreme altitudes, above the "Armstrong line" of 63,000 ft., with the subject protected by a pressure suit but with a hand unprotected, fluids vaporize beneath the exposed skin and in the unprotected joints, and a painless emphysema or "vapo-edema" results (fig. 2). The gas cannot progress because it becomes pressurized if it moves under the edge of the suit or if the ambient pressure is restored to a higher level. If the hand is pressurized but a gap is left on the forearm, the same phenomenon is observed in the exposed area. Microscopic examination has failed to reveal any harmful effects of this phenomenon.

Summary

A pressure-differential tank was created to study the reaction of the body to an imbalance between breathing pressure and the pressure that surrounds the rest of the body. The hypertension of pressure is believed to be apparent rather than real.

Electrocardiographic changes resulting from positive-pressure breathing are strongly suggestive of myocardial hypoxia. It is possible that the pressure gradient across the coronary system may be decreased in the face of increased demand for oxygen by the myocardium, complicated by other factors. Experiments were terminated because of electrocardiographic changes, uncontrolled increase in pulse rate, or impending syncope.

The absolute level of pressure breathing is very important, as one would expect, but the ratio of that level to the total ambient pressure is also quite important. Age, physique, and physical fitness failed to show any statistical relationship to performance in this group of 56 young male subjects. A modified cold pressor test may eventually offer some help as a predicting device for performance under pressure breathing. It is currently being evaluated. Above the "Armstrong line" of 63,000 ft. fluids vaporize beneath the exposed skin and in the unpressurized joints, giving a painless emphysema or "vapo-edema."

5580 Gross Dr. (3) (Captain McGuire).

References

1. Zuidema, G.; Edelberg, R.; and Salzman, E.: Device for Indirect Recording of Blood Pressure, Special Communication, J. Appl. Physiol. **9:**132-134 (July) 1956.
2. Zipf, R.; Webber, J.; Grove, R.; and McGuire, T. F.: J. Lab. & Clin. Med., to be published.
3. Fenn, W. O.; Otis, A. B.; and Rahn, H.: Studies in Respiratory Physiology, Air Force Technical Report 6528, (Aug.) 1951, p. 124.
4. Raab, W.: Hormonal and Neurogenic Cardiovascular Disease: Endocrine and Neuro-Endocrine Factors in Pathogenesis and Treatment, Baltimore, Williams & Wilkins Company, 1953.
5. Hamilton, W. F.; Woodbury, R. A.; and Harper, H. T.: Physiologic Relationships Between Intrathoracic, Intraspinal, and Arterial Pressures, J.A.M.A. **107:**853-856 (Sept. 12) 1936. Rushmer, R. F.: Circulatory Effects of Three Modifications of Vaisalva Experiment: Experimental Survey, Am. Heart J. **34:**399-418 (Sept.) 1947. Bjurstedt, H.; Wood, E. H.; and Aström, A.: Cardiovascular Effects of Raised Airways Pressure, Acta physiol. scandinav. (no. 2-3) **29:**190-201, 1953. Björk, V., and Malmström, G.: Simultaneous Left and Right Atrial Pressure Curves During Valsalva's Experiment, Am. Heart J. **50:**742-748 (Nov.) 1955.
6. Sarnoff, S.: Personal communication to the authors.

Kidney Weighing Less Than One Hundred Grams.—The diminutive kidney—that is, one weighing less than 100 gm.—occurs frequently enough to present a problem of diagnosis and treatment both to general practitioners and urologists. There are several causes: Hypoplasia, in which the kidney is miniature or rudimentary at birth due to arrested development; aplasia, in which there is no true kidney, only remnants of parenchyma and vascular pedicle; pyelonephritic atrophy resulting from infection and obstruction in which atrophy due to nephrofibrosis usually takes place in a kidney of normal size at birth, although, it may occur also in a hypoplastic kidney. Recognition of the condition is important, for it may be the cause of intractable lumbar and abdominal pain, of obscure symptoms that seem referable to the gastrointestinal tract, and of chronic urinary tract infection, sometimes accompanied by chills and fever. It may be the cause of hypertension, particularly in cases in which there is sclerosis of the blood vessels.—C. P. Mathe, M.D., The Diminutive Kidney, *California Medicine*, February, 1956.

GASTROINTESTINAL BLEEDING AS SEEN BY THE PROCTOLOGIST

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• *Bleeding after anorectal surgery sometimes comes from sources other than the operative site. Four cases are given to illustrate the resulting problems. In each the hemorrhage was severe and the source remained undertermined, but the patient recovered. Allergies, sensitiveness to foods or drugs, psychic factors, and blood dyscrasias were considered as possible causes, and the treatment included transfusions, bed rest, vitamin K given intravenously, carbazochrome salicylate, or estrogens. Bleeding from the operative site can result from failure of a ligature, premature or ungentle digital examination, secondary sloughing about ligated pedicles, or strains connected with defecation. Postoperative bleeding severe enough to require return to the operating room and resuturing occurred only once in a series of 2,000 anorectal operations.*

Although hemorrhage from the gastrointestinal tract is usually classified under intrinsic and extrinsic causes, from the proctologist's viewpoint it is preferable to discuss it as (1) bleeding from the operative site and (2) bleeding from sources other than the operative site. Both of these sources of bleeding may have intrinsic as well as extrinsic causes; the second classification may include postoperative as well as nonsurgical cases.

Bleeding from Operative Site

The principal causes of bleeding from the operative site, which may take place within the first 24 hours or as long as two weeks after the operation, are given below.

Failure of the Ligature.—Occasionally a large pedicle slips from the suture. This is rather uncommon, occurs during the first 24 hours, and requires immediate resuturing.

Digital Examination.—Early vigorous digital examination may disturb the sutures and vascular bed. Such danger can be lessened by avoiding digital examinations for the first week to 10 days after operation or, if examinations are done, by doing them very carefully. The question of performing such examinations after rectal operations is controversial. Some physicians feel digital examinations should be started two or three days postoperatively in order to maintain smooth, healthy wound surfaces and to prevent postoperative strictures of the anal canal. Others feel there should be no digital examinations for at least two weeks after operation. There can probably be no hard and fast rule. If examination is done, it should be carried out very gently, with a well-greased finger cot, and no attempt should be made after inserting the finger to bend it or forcibly to expand the canal. In the cases when bleeding occurs, packing the canal with one of the oxidized cellulose products usually suffices to control the bleeding. In some instances it may be necessary to suture or ligate a vessel.

Secondary Slough.—Bleeding occurring from the 9th to the 12th postoperative day is uncommon and usually indicates a secondary slough at the area of suture of the pedicle. It can be rather severe and requires packing with oxidized cellulose or resuturing. The insertion of a Bardex tube and inflating the 30-cc. balloon with water has been very helpful in arresting the bleeding, even if only temporarily, until suturing can be carried out.

Bleeding from Straining or Hard Stools.—Bleeding from straining or hard stools usually occurs between the fifth and the ninth postoperative days. After a bowel movement, the patient notices blood dripping. This discharge of blood is probably due to a suture tearing out or a clot being forced from a vessel. It is good practice to explain this to a patient before he is discharged from the hospital. He should be advised to lie down for several hours and to avoid hot sitz baths for 24 hours.

All patients, before operation, are questioned about any bleeding tendencies, either in themselves or in their families. I also use the Lee-White method of measuring blood coagulation time in preference to the capillary method.[1] If the time is prolonged or the history is doubtful, tests for prothrombin time, platelet count or clot retraction time, bleeding time, and Rumpel-Leede phenomenon are performed.

In a review of 2,000 consecutive anorectal operations performed by the proctology department of the Allentown Hospital, the incidence of postoperative bleeding severe enough to require return to the operating room and resuturing was 0.05%. Excluded from this series of cases were those in which anoplasties, incision and drainage of ischiorectal abscesses, and clover-leaf or other types of operations for the relief of pruritus ani were performed, as well as those cases in which bleeding was controlled by the insertion of an oxidized cellulose pack and administration of carbazochrome (Adrenosem) salicylate [2] or intravenous doses of estrogens [3] or vitamin K. Half the operations were performed with the patient under anesthesia with thiopental (Pentothal) sodium (intubated) or spinal anesthesia; the other half were performed with the use of local infiltration with a 1% solution of procaine hydrochloride, with 3,4-dihydroxyphenylpropanolamine (Cobefrine) and 300 turbidity-reducing units of hyaluronidase. There was no appreciable difference in the incidence of postoperative bleeding between the two groups.

Bleeding from Other Sources

Bleeding from sources other than the operative site includes bleeding from lesions from the esophagus to the rectum and from such conditions as blood dyscra-

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sias, allergies, and possibly the debatable ones involving psychogenic and hormonal factors.

Although the most common sources of rectal bleeding are hemorrhoids, fissures, carcinomas, and polyps, massive hemorrhage from the rectum is often associated with peptic ulcer and esophageal varices.[4] It is important that the proctologist be acquainted with all the causes of gastrointestinal bleeding and their diagnoses and treatments; however, peptic ulcer and esophageal varices are most frequently seen and treated by the general surgeon and are not within the province of this paper.

I shall confine my remarks to those lesions causing rectal bleeding that are found below the ligament of Treitz. If hematemesis occurs, with or without rectal bleeding, it almost always indicates a lesion above the ligament, although bleeding from the rectum, even of bright red blood and without hematemesis, does not rule out etiological factors in the upper part of the gastrointestinal tract. The most common causes of rectal bleeding between the ligament of Treitz and the anal verge will be discussed.

Hemorrhoids.—Hemorrhoids are the most common source of rectal bleeding and are diagnosed by proctoscopy. Active bleeding may not be seen at the initial examination and repeated examinations may be necessary. It must be remembered that there may be more than one source of bleeding, and, if any doubt exists after sigmoidoscopic examination, a double contrast x-ray of the colon may be necessary to rule out other lesions. Every proctologist can recall instances of polyps found after hemorrhoidectomy when bleeding continued and x-rays revealed the lesion. A slough following intrarectal injection of medicaments can also cause severe bleeding.

Anal Fissure.—With an anal fissure, the bleeding is usually slight in amount but may at times cause discoloration of the water in the bowl after an evacuation. Digital examination will lead to a suspicion of the disorder, and proctoscopy will confirm the diagnosis.

Polyps of the Rectum and Colon.—Polyps of the rectum and colon are a frequent source of intermittent bleeding. The amount and color of the blood varies with the size, location, type, and degree of ulceration. Polyps and anal fissure are the most common source of rectal bleeding in infants and children. If not visible by sigmoidoscopy, they will be found by means of x-ray of the colon, which should be repeated for verification.

Hemorrhoids, anal fissure, and polyps all require surgery, except possibly a fissure or superficial abrasions in an infant. Such abrasions in infants are generally secondary to passage of a hard stool in those cases in which there has been incomplete absorption of the anal plate. Digital dilatation will usually suffice as treatment.

Ulcerative Colitis.—A fourth cause of rectal bleeding, ulcerative colitis, can be associated with very severe bleeding and, since the large majority of cases start in the rectum or rectosigmoid, can usually be diagnosed by proctoscopic and sigmoidoscopic examinations. The treatment of the disease is primarily medical; however, in those cases refractive to medical treatment, surgery may be necessary. There are also cases of segmental colitis, which must be diagnosed by x-ray examination or surgical exploration.

Colonic Diverticulum.—Colonic diverticula, of which 80% are found in the sigmoid, occur in 8% of all people over 40 years of age. There are numerous papers written each year as to the extent or probability of rectal bleeding from diverticulosis and diverticulitis; the great majority of men dealing with this problem feel that bleeding of the intermittent type does occur in both conditions and that even massive hemorrhage may occur. Hoar and Bernhard[5] reported that the incidence of bleeding accompanying diverticulitis in a series of 111 patients without associated carcinomas was 37%; the incidence of bleeding in diverticulosis in 236 patients was 16%. Young and Howarth[6] reported a case of massive hemorrhage from colonic diverticula that supports the theory that the hemorrhage is due to inversion of the diverticula and subsequent mucosal ulceration and exposure of a ruptured blood vessel. Conservative medical and dietary management is used in most cases, but surgery must be resorted to when recurrences are frequent or the attacks are severe and disabling.

Meckel's Diverticulum.—Meckel's diverticulum occurs in 2% of all people and may be found anywhere from 15 to 100 cm. from the ileocecal valve on the antimesenteric border of the ileum. The etiology of the bleeding is ulcerated ectopic gastric mucosa or, rarely, pancreatic tissue. Of the patients with the disorder, 75% bleed; the bleeding may be profuse and persistent. X-ray is of little value in diagnosing the condition. Exclusion of other conditions and exploratory laparotomy are necessary for diagnosis.

Angiomas of the Gastrointestinal Tract.—A seventh cause of rectal bleeding is angiomas of the gastrointestinal tract. Hereditary hemorrhagic telangiectasia, while not common, must be kept in mind. Angiomas are usually of familial tendency and are associated with multiple lesions of the skin and mucous membrane, with recurrent hemorrhages. Hemorrhagic tendencies do not usually manifest themselves until adult life; epistaxis is the most frequent manifestation of such tendencies. When multiple lesions occur in the gastrointestinal tract, x-ray is of little value in diagnosis. If the angiomas can be found, removal by segmental resection is indicated. It is reported that carbazochrome salicylate and conjugated estrogenic substances, given intravenously and orally, have been of value.

Factitial Proctitis.—Another cause of rectal bleeding, factitial proctitis,[7] denotes injury to the rectum due to irradiation of the cervix. Bleeding, which usually occurs within the first five months after treatment, may occur either as blood-stained mucus or as frank bleeding with clots. Spontaneous healing may take one to two years and will only take place if the primary disease is arrested. Treatment with enemas of isotonic sodium chloride solution followed by intrarectal insertion of 75 mg. of hydrocortisone in water-soluble jelly twice a day is advocated.

Carcinoma of Rectum.—Another common cause of rectal bleeding is carcinoma of the rectum.

Report of Cases

The following reports are those of four unusual cases of massive gastrointestinal hemorrhage following rectal surgery in which the source of bleeding was not from the operative site.

CASE 1.—A 35-year-old male, under spinal anesthesia, had a hemorrhoidectomy in May, 1953. A Foley balloon catheter was used for four days. The patient required an excessive amount of postoperative sedation, and his bowel movements were very difficult to regulate. On admission to the hospital, his hemoglobin level was 12.5 gm. per 100 cc.; the red blood cell count was 4,600,000 per cubic millimeter; and the capillary coagulation time was two minutes. There was no history of any bleeding tendency. A severe hemorrhage occurred on the seventh postoperative day. There was no evidence of bleeding from the operative site. The Lee-White coagulation time was 20 minutes, and the prothrombin time, bleeding time, platelet count, and the test for Rumpel-Leede phenomenon were normal. The patient again bled on the 10th and 14th postoperative days and in all was given 11 pt. (5.2 liters) of blood. He had been given phthalylsulfathiazole (Sulfathalidine) with vitamin K and bile salts for three days preoperatively. He was discharged on the 31st postoperative day, with no bleeding and with the Lee-White coagulation time at 19 minutes. Six months after discharge he was well and the Lee-White coagulation time was normal.

CASE 2.—A 21-year-old female, under spinal anesthesia, had a fissurectomy and hemorrhoidectomy in April, 1948. Admission laboratory studies showed a hemoglobin level of 12.5 gm. per 100 cc. and a red blood cell count of 4,800,000 per cubic millimeter. The capillary coagulation time was 3½ minutes. She was discharged on the fourth postoperative day. On the fifth day she had normal bowel movements, but on the sixth day she bled severely and was readmitted to the hospital. A gauze packing was inserted in the rectum through a proctoscope in order to examine the wound. The wound showed no evidence of bleeding; when the packing was removed, bright and dark blood poured down from above. This was removed by suction through the sigmoidoscope, and at 20 cm. bright blood was still coming down from above. Two pints (1,000 cc.) of blood was given as well as 72 mg. of menadiol (Synkayvite) sodium diphosphate intravenously. The prothrombin time was 50%; the hemoglobin level was 9 gm. per 100 cc.; the red blood cell count was 2,960,000 per cubic millimeter; the capillary coagulation time was two minutes; and the platelet count was normal. Hemorrhage decreased and then, within six hours, started again.

An exploratory laparotomy showed blood throughout the large and small intestine. No growths were palpated from sigmoid to duodenum. The duodenum was opened, but no ulceration could be found. Further transfusions were given, and the bleeding stopped as suddenly as it had started. X-rays of the colon, stomach, and duodenum were negative. The patient was discharged two weeks after admission. She entered the Waves several years later, only to be discharged in six weeks because of nerves and the development of urticarial wheals at the slightest provocation. However, there had been no bleeding from the rectum five years after discharge from the hospital.

CASE 3.—A 69-year-old female was operated on in February, 1953, for hemorrhoids. Three weeks after discharge from the hospital, she developed a so-called virus infection with diarrhea. She was given phthalylsulfathiazole by her family physician and three days later had a severe rectal hemorrhage, with marked symptoms of shock. The sigmoidoscopic examination showed marked inflammatory changes of the entire mucosa, with bright red blood coming from above the 18-cm. area. She was given blood transfusions and placed on a low-residue diet and bed rest. On admission, the blood studies were as follows: the hemoglobin level was 8.5 gm. per 100 cc.; the white blood cell count was 3,900 per cubic millimeter; the platelet count was 103,000 per cubic millimeter; the serum protein level was 5.4 gm. per 100 cc.; and the Lee-White coagulation time and prothrombin time were normal. The patient was discharged on the eighth postoperative day. Since that time she has been well and has had no further episodes of rectal bleeding.

CASE 4.—A 36-year-old female, under spinal anesthesia, underwent a hemorrhoidectomy in July, 1952. She was discharged on the sixth postoperative day. Two days later she had a severe hemorrhage and was readmitted to the hospital in a state of shock. The proctoscope was inserted, and bright and dark blood gushed out. She was given transfusion under pressure, receiving 1,500 cc. of blood. The hemoglobin level was 9.4 gm. per 100 cc. on the patient's admission; the prothrombin time was normal; and the Lee-White coagulation time, taken with the use of 8-mm. tubes, was 21 minutes. The rectum was cleansed by suction and absorbable gelatin sponge was inserted, although no areas of bleeding could be seen. The family, when questioned, said the patient had had a transfusion after delivery of her child and also after a tooth extraction. She was discharged on the 18th postoperative day, with a Lee-White coagulation time of seven minutes. When last seen in 1955, she had been well since her operation.

The question of etiology of the bleeding in the preceding cases is debatable but may be due to one or a combination of the following conditions: allergy, psychic factors, blood dyscrasias, and food or drug sensitivity. All the patients had one thing in common: they were extremely nervous and apprehensive. They all responded to transfusions, bed rest, and medication where indicated, including vitamin K given intravenously, carbazochrome salicylate, or estrogens.

Summary

In spite of the advances in medical knowledge, diagnosis and treatment in cases of hemorrhage from the gastrointestinal tract is very often difficult and presents a baffling problem. In addition to the usual forms of postoperative bleeding arising from the surgical site, hemorrhage of a massive nature, from sites other than the operative area, is encountered. In each of the four cases discussed the hemorrhage was severe and the source remained undetermined, but the patient recovered. Allergies, sensitiveness to foods or drugs, psychic factors, and blood dyscrasias were considered as possible causes, and the treatment included transfusions, bed rest, vitamin K given intravenously, carbazochrome (Adrenosem) salicylate, and/or estrogens.

Bleeding from the operative site can result from failure of a ligature, premature or ungentle digital examination, secondary sloughing about ligated pedicles, or strains connected with defecation. Postoperative bleeding severe enough to require return to the operating room and resuturing occurred only once in a series of 2,000 anorectal operations. There was no difference with respect to postoperative bleeding between the results of the last 1,000 consecutive anorectal operations with the patient under local anesthesia and a similar series with the patient under spinal or thiopental (Pentothal) sodium anesthesia.

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References

1. Quick, A. J.: Diagnostic Approach in Hemorrhagic State, J. Iowa M. Soc. **45**:321-323 (July) 1955.

2. Sherber, D. A.: Control of Bleeding, Am. J. Surg. **86**:331-335 (Sept.) 1953.

3. Jacobson, P.: Spontaneous Hemorrhage: Clinical Entity, with Special Reference to Epistaxis, A. M. A. Arch. Otolaryn. **59**:523-530 (May) 1954.

4. Mathewson, C., Jr.: Massive Gastrointestinal Hemorrhage, Surg. Gynec. & Obst. **102**:239-240 (Feb.) 1956.

5. Hoar, C. S., and Bernhard, W. F.: Colonic Bleeding and Diverticular Diseases of Colon, Surg. Gynec. & Obst. **99**:101-107 (July) 1954.

6. Young, J. M., and Howorth, M. B., Jr.: Massive Hemorrhage in Diverticulosis: Possible Explanation of Cause with Presentation of Case Requiring Surgical Treatment, Ann. Surg. **140**:128-131 (July) 1954.

7. Sherman, L. F.: Reevaluation of Factitial Proctitis Problem, Am. J. Surg. **88**:773-779 (Nov.) 1954.

EARLY DIAGNOSIS IN MASSIVE UPPER GASTROINTESTINAL BLEEDING

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• *As much diagnostic information as possible should be obtained before instituting treatment for massive upper gastrointestinal bleeding. A thorough anamnesis may reveal previous hemorrhages, or operations, or treatment with a number of drugs that can provoke hemorrhage. Physical examination and laboratory studies are sometimes especially informative. X-ray examination can be done safely within 24 hours after the patient has entered the hospital; it is often decisive. If it is not, and if the bleeding continues, endoscopy is advised. Endoscopy has at times disclosed the source of bleeding when the x-ray findings had been normal.*

Rational management in cases of massive upper gastrointestinal hemorrhage requires exact diagnosis. In this paper, by early diagnosis I mean diagnosis within 24 to 48 hours of the time the patient enters the hospital with such bleeding. The condition of the patient often presents the problem of whether emergency surgery is necessary within 24 to 48 hours of initial observation; unless the diagnosis is known with certainty, rational surgery cannot be initiated. Hematemesis is usually present upon the patient's admission to the hospital. Tarry stools are also present, and in occasional cases tarry, crimson, or maroon stools may be present without hematemesis in a patient with a bleeding upper gastrointestinal lesion. However, from a practical point of view, the presence of hematemesis limits the causative lesion to the duodenum, stomach, and esophagus.

While peptic ulcer of the duodenum and stomach (70%) and esophageal varices (10 to 15%) are the most frequent causes of bleeding, I, with Jeghers, have recently indicated the diverse etiologies possible in such cases.[1] In this paper, I shall discuss the valuable points or clues to be obtained from the history and physical examination of the patient and from the x-ray study and endoscopic procedures in reaching an early exact diagnosis of the etiological factor or factors in the given case of gastrointestinal hemorrhage.

History and Examination

From the history, one may be able to obtain valuable clues in making the diagnosis. Certainly, a confirmed history, by either radiologic or surgical means, of duodenal or gastric ulcer is extremely important. A history of an operation for peptic ulcer, such as a gastroenterostomy or subtotal gastric resection, is also important in indicating the possibility of recurrent hemorrhage. The history of recurrent hemorrhage is in itself of major importance, in that it may indicate, more likely than not, the presence of peptic ulcer. A history of previous liver disease or of jaundice, ascites, or edema may be helpful in indicating the presence of esophageal varices due to chronic liver disease. The presence of pain is not specifically diagnostic, since it should be remembered that in many patients with peptic ulcer pain usually disappears when the hemorrhage begins. This is an observation that has been made many times. However, a long history of recurrent pain is more indicative of peptic ulcer than it is, for instance, of a carcinoma of the stomach. A history prior to the bleeding of dysphagia, regurgitation, and radiation of a burning sensation into the chest may point to the esophagus as a possible site of disease. Lesions that may cause such bleeding in the esophagus usually are in the nature of a tumor, hiatal hernia, or an esophageal ulcer.

In this matter of gastrointestinal bleeding it is important to obtain from the patient or the patient's relatives information about the type of drugs, if any, that the patient has been taking. The salicylates, and especially aspirin, have recently been indicted as a most frequent cause of bleeding, particularly in patients with peptic ulcer. Muir and Cossar [2] have indicated that 25.9% of patients with peptic ulcer have a recent record of ingestion of aspirin shortly prior to the onset of hemorrhage. While my studies have not indicated this great frequency, I have seen patients in whom bleeding has started shortly after the ingestion of salicylates.

The administration of steroids for various diseases is quite widespread. The use of cortisone acetate, corticotropin, and such preparations as prednisone and prednisolone have been reported as being possible causative factors in the onset of gastrointestinal bleeding. This bleeding is due to ulceration of the stomach and duodenum. It is still not clear whether these substances start ulceration or whether they, by an increase in the stimulation of secretion of acid and pepsin, exacerbate preexisting ulceration. Another drug, used for the treatment of rheumatic diseases, that has been implicated in the same manner is phenylbutazone. The anticoagulant drugs, such as bishydroxycoumarin, may also cause gastrointestinal bleeding. Drugs used in the treatment of hypertension have also been implicated. Reserpine, which causes an increase in gastric secretion of acid, has been reported in this respect.

A history of alcoholism may be important, not only as indicating the possibility of cirrhosis and esophageal varices but also as indicating the possibility of acute gastritis and the Mallory-Weiss syndrome. Gastrointestinal ulceration and bleeding after operations, particularly those on the central nervous system, have been quite well documented since their initial description by Cushing.[3] During acute poliomyelitis, acute ulceration with bleeding is also well known. A history of severe external burns may also be associated with ulceration and bleeding. A family history of prolonged bleeding, with reference to either the gastrointestinal

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tract or other systems, may be important. This is particularly true in patients who have chronic nosebleeds and a family history thereof, since the possibility of hereditary hemorrhagic telangiectasia should be kept in mind.

When the bleeding is caused by peptic ulcer of the stomach or duodenum, the physical examination does not afford many clues. Tenderness may or may not be present, and it should be recalled that bleeding may be the only manifestation of peptic ulcer in about 15 to 20% of all patients with such disease. Pain may be absent in such instances. The physical examination may be extremely helpful in indicating the presence of cirrhosis and esophageal varices. From this point of view, the presence of spider nevi, jaundice, ascites, hepatomegaly, splenomegaly, and an abdominal venous pattern may be extremely important clues. The finding of the typical telangiectatic lesions of the skin and mucous membranes is important in suggesting hereditary hemorrhagic telangiectasia. The finding of melanin pigmentation about the lips and buccal mucosa may suggest intestinal polyposis, which may involve the stomach but almost always involves the small intestine and which may cause bleeding.[4] The finding of enlarged lymph nodes in the left supraclavicular area or axilla or the finding of Blumer's shelf may suggest neoplasm of the stomach or other gastrointestinal organs. The examination can be briefly and thoroughly done while treatment for blood loss is being given.

The history and physical examination may leave us still unclear as to the exact causation of bleeding in many patients. Laboratory data are usually not very helpful in distinguishing the diagnosis immediately. The rare case of leukemia (diagnosed by blood smear examination) with gastrointestinal bleeding may be the exception. An attempt to differentiate between bleeding from peptic ulcer and that from esophageal varices has been made by use of the sulfobromophthalein sodium test. It has been suggested that retention of over 15% of the dye usually means bleeding from esophageal varices.[5] However, the anoxia resulting from massive blood loss may cause abnormal retention in a patient whose liver is quite normal. This is indicated by the fact that, when blood replacement has been accomplished, the amount of sulfobromophthalein sodium excretion may be markedly increased from the initial amount excreted while the patient was still in shock or just after shock had been alleviated. We must, therefore, seek more direct methods to demonstrate the lesion causing the bleeding.

X-ray and Endoscopic Procedures

In most hospitals x-ray examination of the upper gastrointestinal tract is the most commonly used and most frequently available method for demonstrating the lesion. It has been conclusively shown that early examination is not only feasible but is quite safe. It is my opinion that such x-ray examination should be performed within 24 to 48 hours after the patient is admitted to the hospital, for ulcerative lesions of the duodenum and, particularly, the stomach may heal rapidly with treatment and unless such examination is performed rather quickly the lesion may be completely missed. I have seen gastric ulcers, followed gastroscopically, disappear in a matter of several days. In the performance of x-ray examination, the so-called Hampton technique is widely used, but it has been my experience that more thorough examination can be performed on the initial x-ray examination. (The Hampton technique is that in which, shortly after the patient's admission to the hospital for bleeding, gastrointestinal roentgenographic studies are made, with no pressure being applied to the abdomen. The patient may be rolled to the x-ray department in his bed and returned to the ward promptly after the study.)

It is extremely important to properly prepare the patient prior to x-ray examination. It is essential that the stomach be empty of secretions and blood clots. In my experience this can best be accomplished by using a stomach tube of wide diameter and by lavaging the stomach with either ice water, as is recommended by Palmer,[6] or lukewarm water. It does appear that occasionally with such lavage bleeding seems to stop, at least for awhile. X-ray examination may indeed give the diagnosis, not only with reference to ulcer of the duodenum and stomach but also with reference to the findings of tumors in these areas and of hiatal hernia. In a sizable proportion of patients, even after thorough x-ray examination, the diagnosis may still not be clear. I have not seen any undue results from early x-ray examination. I am referring, of course, to such examinations made within 48 hours of the patient's admission to the hospital.

In the case in which the diagnosis is not definite but in which bleeding continues, a real problem arises. Despite blood replacement, there may be a continual loss of blood. When bleeding continues at a brisk rate, it is practically impossible to perform an x-ray examination. In the patient in whom x-ray examination has been done and in whom no diagnosis has been established, the next method of examination is endoscopy. Therefore, I use endoscopy to attempt to make a diagnosis in the patient whose bleeding continues and also in the patient in whom the x-ray has not given a definite answer.

Again, in preparing these patients for examination, it is necessary to have a clean stomach and esophagus, if only temporarily. This can best be accomplished by a lavage with ice water. Esophagoscopy, with the use of the semiflexible Eder-Hufford esophagoscope, can be easily accomplished in a treatment room. With continuous suction, the esophagus can be kept clean; of course, an important notation is whether bleeding is occurring in the esophagus. The most important diagnostic information obtained from esophagoscopy is whether varices are present. However, a negative esophagoscopy is also extremely important, as will soon be indicated. In some instances, esophagoscopy is immediately followed by gastroscopy, by which means alone hemorrhagic gastritis can be diagnosed. Occasionally, the linear mucosal tear of the Mallory-Weiss syndrome has been seen. In my experience, I have diagnosed two such cases in which the x-ray examination had been completely normal. On routine medical management both of the patients recovered.

Gastric ulceration, polyps, neoplasm, and angiomas are some of the findings that I have encountered on gastroscopy in patients with bleeding.

The importance of negative esophagoscopy is particularly valuable in the case in which bleeding continues. Even when the diagnosis is not definite, consideration of surgery, usually a subtotal gastric resection, is important. Since massive upper gastrointestinal hemorrhage means that the bleeding is coming from the duodenum, stomach, or esophagus, blind subtotal gastric resection is the correct procedure, when there is a negative esophagoscopy, since ulcerative lesions in the stomach and duodenum are correctly treated by such surgery.

There is no competition between x-ray examination and endoscopic examination. When both are done, more information will be available than when only one procedure is used to the exclusion of the other. In most cases, when the bleeding has stopped and is of moderate degree, the x-ray may well give the answer. In those instances, endoscopy may not be necessary. However, when brisk bleeding continues, x-ray may not be technically feasible. In such an instance endoscopy may be extremely helpful. Furthermore, there will be about 20 to 30% of the cases of massive gastrointestinal bleeding in which the x-ray will not give definite information. In these cases also, endoscopy may add to diagnostic accuracy.

Conclusions

It is my belief that the use of all methods of examination, including the taking of history, physical examination, laboratory data, and x-ray and endoscopic examinations, have their place in the early diagnosis of the patient with massive upper gastrointestinal bleeding. The most definite information will be obtained by x-ray and endoscopic examinations.

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References

1. Brick, I. B., and Jeghers, H. J.: Medical Progress: Gastrointestinal Hemorrhage (Excluding Peptic Ulcer and Esophageal Varices), New England J. Med. **253**:458-466 (Sept. 15) 1955; ibid. 511-518 (Sept. 22) 1955; ibid. 555-560 (Sept. 29) 1955.

2. Muir, A., and Cossar, I. A.: Aspirin and Ulcer, Brit. M. J. **2**:7-12 (July 2) 1955.

3. Cushing, H.: Peptic Ulcers and Interbrain (Balfour Lecture), Surg. Gynec. & Obst. **55**:1-34 (July) 1932.

4. Jeghers, H. J.; McKusick, V. A.; and Katz, K. H.: Generalized Intestinal Polyposis and Melanin Spots of Oral Mucosa, Lips and Digits: Syndrome of Diagnostic Significance, New England J. Med. **241**:993-1005 (Dec. 22) 1949; ibid. 1031-1036 (Dec. 29) 1949.

5. Zamcheck, N.; Chalmers, T. C.; Ritvo, M.; and Osborne, M. P.: Early Diagnosis in Massive Gastrointestinal Hemorrhage, J. A. M. A. **148**:504-507 (Feb. 16) 1952.

6. Palmer, E. D.: Observations on Vigorous Diagnostic Approach to Severe Upper Gastrointestinal Hemorrhage, Ann. Int. Med. **36**:1484-1491 (June) 1952.

CURRENT PROBLEMS IN MANAGEMENT OF PATIENTS WITH PORTAL HYPERTENSION

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• *Bleeding from varices in patients with portal hypertension presents certain perplexing problems. The danger of recurrence of bleeding must be weighed against the hazards of the various types of shunting operations and the neuronutritional deficits that follow. In the individual case, portal venography and the determination of blood pressures in the portal system give valuable data. Three cases illustrate these points. In one patient an end-to-side portacaval anastomosis reduced the portal pressure from 35 cm. to 20 cm. of saline solution; bleeding did not recur. In the second patient varices persisted and hemorrhages recurred for years after splenectomy without evidence of portal hypertension; the varices disappeared and bleeding stopped after a limited esophagogastrectomy. A third patient illustrates the effectiveness of a portacaval shunt in reducing the portal blood pressure and abolishing an ascites that had not yielded to other measures. More information is needed as to the operative and postoperative hazards of shunting operations as compared with the danger of recurrent hemorrhages under improved medical treatment.*

In 1945, Whipple[1] wrote of his initial efforts to introduce Eck's fistula or one of its modifications for the control of variceal hemorrhage in man:

> These procedures are as yet purely experimental. They have been carried out in patients that had had repeated severe hemorrhages, and for whom conservative measures offered no hope. . . . It will require a follow-up period of three years, or more, to determine the value of these portacaval short-circuiting procedures. At least they represent a bold attempt to deal with the problem of portal hypertension in its life-threatening forms.

There is no doubt today that a patent anastomosis of good size between the portal and systemic circulations reduces elevated levels of portal pressure to normal and, in the vast majority of instances, prevents further hemorrhage from esophagogastric varices. Furthermore, it is evident from reports available for study that these shunts remain open, that the dilated veins of the lower part of the esophagus and upper

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part of the stomach subside, and that the enlarged spleen, if not removed in the course of portal decompression, shrinks remarkably in size. It is also clear that a number of perplexing problems remain unanswered and that portal decompression has perhaps raised as many questions as it has solved. Rather than review again the clinical accomplishments of the procedure, it seems more profitable to consider certain of the less well accepted and more controversial aspects of portal hypertension and bleeding varices.

Problems Common to Extrahepatic and Intrahepatic Block

Before considering in detail portal hypertension due to extrahepatic and intrahepatic block, we should like to comment on several problems common to both types. The first concerns the immediate etiology of the massive hemorrhages that threaten the lives of these patients. At first thought, the cause of hemorrhage from varices seems simple enough, but proof of why patients bleed massively from esophagogastric varices has proved elusive. Pathologists who describe what they see at autopsy have learned that in about 50% of patients dying of variceal hemorrhage frank ulceration is present; in 40% there appears to be a clean tear, as though the varix had ruptured mechanically; and in the remaining 10% a site of hemorrhage cannot be demonstrated.[2]

The two conventional explanations, therefore, for hemorrhage are rupture due to increased pressure and ulceration secondary to esophagitis. If high pressure be the explanation, why do not the other varices, such as those of the coronary system or in the retropancreatic area, likewise bleed massively? Intraperitoneal variceal hemorrhage, however, is almost unheard of. Or if ulceration be the primary cause of a given hemorrhage, why is this not preceded by dyspepsia suggesting esophagitis? Yet, in patients with varices, incompetence of the esophagogastric sphincteric mechanism has not been demonstrated. From time to time it has been intimated that the hemorrhagic diathesis associated with portal hypertension and congestive splenomegaly might precipitate esophagogastric hemorrhage. At present, the consensus is that thrombocytopenia does not initiate bleeding, though it may encourage continuing hemorrhage.

The precise cause of hemorrhage from varices may well appear to be an academic point. On the other hand, the primary indication for portal decompression today is the threat of variceal hemorrhage. In themselves varices appear to be of little consequence, and if a way were found to guarantee freedom from hemorrhage, patients would not need to undergo as major an operation as a splenorenal or portacaval shunt. Should, of course, hemorrhage ultimately prove to be entirely a phenomenon of increased pressure, portal decompression will doubtless survive as an important surgical operation.

A second problem common to both intrahepatic and extrahepatic block concerns the importance of the portal hypertension itself. Many believe that this is without deleterious effects. This may well be so, yet too little attention has been given to the possibility that elevated portal pressure may seriously interfere with absorption of nutriments from the gastrointestinal tract. In cirrhosis, of course, the additional possibility exists that high portal pressure may compromise normal hepatocellular function. Militating against this view is the fact that patients with extrahepatic block are generally regarded to be in a good nutritional state. From this the inference is drawn that portal hypertension is innocuous. As far as the patient with cirrhosis is concerned, attention has so long been focused on the hepatic end of the portal venous bed that little consideration has been given the other or intestinal end of this venous circuit. Whatever may ultimately be learned of these complex hemodynamic relationships, the possibility of portal hypertension itself being harmful cannot be ignored.

An important problem common to both extrahepatic and intrahepatic block is the management of the acute hemorrhage. Here, clinical experience teaches that among patients with extrahepatic block hemorrhage may be controlled by tamponade or it may cease spontaneously. In addition, once hemorrhage has stopped and replacement therapy has been completed, these patients promptly return to a state of relatively good health. In patients with cirrhosis, on the other hand, hemorrhage is notoriously difficult to control and is all too frequently followed by deepening jaundice, ascites, and even coma.

There is great incentive, therefore, to arrest hemorrhage in cirrhosis quickly. This circumstance has given rise to a number of divergent views upon the proper management of the acute hemorrhagic episode. One school believes that the bleeding varices can always be controlled by carefully regulated double balloon tamponade; another, that tamponade should only be considered a means for stopping hemorrhage while the patient is being prepared for immediate ligation by suture of the bleeding varix; and others, having less faith in pneumatic tamponade and seeking to avoid two operations, have suggested that a portacaval shunt may be done as an urgent procedure. Still others believe that division and resuture of the stomach and its attached vascular ligaments will successfully exclude the dilated and bleeding varices from the hypertensive and hypervolemic portal bed.

The acrimonious discussions of this particular aspect of the management of bleeding varices emphasize that a single way of controlling hemorrhage successfully has not been found. Furthermore, there are probably differences in the technique of tamponade that have not been resolved. For instance, some believe in a double balloon tamponade, while others rely upon a single balloon. This latter apparatus requires about 2 lb. of tension to control bleeding. This pull is not tolerated long by the patient and serves as an important stimulus to ligate the varices promptly. As experience increases, the indications for one or another of these several methods for controlling hemorrhage from varices will undoubtedly be clarified.

Certainly those reporting mortality and morbidity rates among such patients should document the degree of hepatic reserve present more carefully than has heretofore been the custom. A patient with severely

compromised hepatic function cannot be expected to tolerate any emergency procedure well. Conversely, in a patient whose liver function is excellent bleeding may well stop during a relatively short period of effective tamponade. If it does not, the patient can be expected to survive ligation of his varices, an urgent shunt, or any other procedure of similar magnitude. Quantitative as well as qualitative data are essential for accurate appraisal of these serious surgical procedures.

Portal Hypertension due to Portal Venous Thrombosis

Patients with portal hypertension due to portal thrombosis are generally children or young adults for whom medical care is sought either because of unheralded variceal hemorrhage or because of anemia and an enlarged spleen. Currently, ideal treatment consists of splenectomy and portal decompression by means of an end-to-side splenorenal shunt. Although some manner of splenorenal shunt can usually be fashioned, an anastomosis of good diameter that remains patent is difficult to achieve consistently. Here, success in controlling hemorrhage depends upon a patent communication existing between the splenic and the coronary veins. If such is not present, a splenorenal shunt can hardly be expected to drain the hypertensive coronary system satisfactorily. A number of failures of splenorenal anastomosis have perhaps related as much to this unfortunate circumstance as to spontaneous closure.

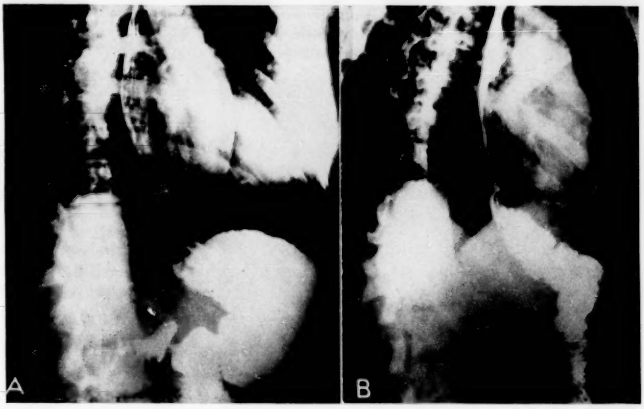

Fig. 2.—*A*, preoperative esophagram in patient with portal venous thrombosis. Extensive varices are obvious. *B*, postoperative esophagram in the same patient taken six months after limited esophagogastrectomy (fig. 1.). All the varices have disappeared.

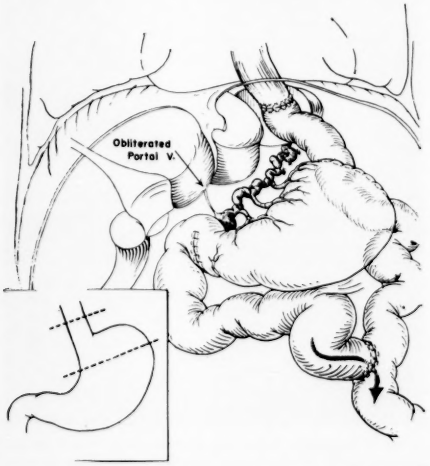

Fig. 1.—Limited esophagogastrectomy, that is, Roux-en-Y esophagojejunostomy, which is useful in patients with portal hypertension and esophageal varices whose portal bed cannot be satisfactorily decompressed.

In addition to the patients who, when first seen, have variceal hemorrhage are those whose splenorenal shunt has failed and those who have had an ill-advised splenectomy alone. The last-mentioned patients have acquired the designation of "postsplenectomy bleeders." In reoperating upon them a variety of surgical procedures are available and justified as additional efforts to prevent further esophagogastric hemorrhage. A dilated superior mesenteric vein may provide another opportunity to decompress the portal circuit by an end-to-side portacaval shunt [3] or side-to-side portacaval shunt.[4] Sometimes the insertion of an autogenous vein graft between the portal and systemic circuits may prove satisfactory. Usually, however, the opportunity for a shunt has been lost and some other operation must be substituted.

Gastroesophagotomy and suture of the varices has its advocates, but this operation, in spite of success reported by Crile,[5] hardly provides protection against further hemorrhage when the varices reappear. When a shunt is obviously out of the question, a logical operation is limited esophagogastrectomy—leaving the stomach in place and reestablishing esophagoenteric continuity by means of a Roux-en-Y esophagojejunostomy (fig. 1). By the use of this procedure, an effort is made to provide protection to the patient from hemorrhage even though the varices recur. Figure 2*A* demonstrates the varices in a young woman with extrahepatic block. They disappeared after esophagogastrectomy (fig. 2*B*). Two years later all the varices had reappeared, but bleeding did not occur during the total follow-up period of five years. The young woman

now leads an active life, maintains excellent nutrition, and has not bled since her resection some five years ago.

Young persons with esophagogastric varices merit one further comment. This relates to an understandable inclination to presume that they all suffer from portal hypertension due to an extrahepatic block. In the majority, this assumption will be correct. A small

Fig. 2A (case 1).—Operative portal venogram showing a normal portal vein of extraordinarily large size.

percentage, however, will be found to have an as yet poorly understood form of juvenile cirrhosis, with intrahepatic rather than extrahepatic obstruction. Among such patients portal venography is useful, for it permits accurate documentation in each individual case. Perhaps this point can be clarified by an account of the histories of two young patients.

Case 1.—A 9-year-old child was admitted to the hospital because of esophagogastric hemorrhage. A splenectomy was performed, and his liver, both by macroscopic examination and by microscopic section, was said to be normal. He continued to bleed. In planning a second operation there seemed little reason to question that the child was suffering from extrahepatic portal venous thrombosis. When he was operated on, his portal pressure was 35 cm. of saline solution and, much to our surprise, a normal portal vein of good size was demonstrated by portal venography (fig. 2A). An end-to-side portacaval anastomosis reduced his pressure to 20 cm. of saline solution, and bleeding did not recur. At the second operation his liver appeared grossly enlarged and finely mottled by fibrous tissue. It was clearly the site of some form of early cirrhosis. This was confirmed on microscopic examination.

Case 2.—A 15-year-old patient had his first esophagogastric hemorrhage. An enlarged spleen was removed, but he continued to bleed every year or so, and large varices were soon demonstrated. Ten years later, at operation, his liver was moderately enlarged and finely mottled, but microscopic examination of a biopsy specimen showed it to be normal. The portal vein was normal. Portal pressure was 15 cm. of saline solution, and on portal venography a large coronary vein of the stomach was visualized in which the pressure was also 15 cm. of saline solution (fig. 3). Here then was a patient whose portal pressure was normal who was bleeding repeatedly from varices. It is difficult to say whether he had had a bout of hepatitis in childhood that had subsided leaving a dilated coronary esophageal circuit or whether his varices might, in fact, have been congenital. Certainly he had not had portal hypertension at the time of his last operation, nor had there been any evidence of cirrhosis. A limited esophagogastrectomy (fig. 1) appeared to offer the greatest protection against further hemorrhage. This was performed uneventfully, and the patient returned to work eight weeks after operation. His varices have since disappeared, and it will be interesting to see whether they recur.

Portal Hypertension Secondary to Cirrhosis of the Liver

In patients with cirrhosis, controversies no longer revolve about whether recurrent hemorrhage can be prevented by portal decompression, for this has been amply proved.[6] Discussions, however, thrive on the question of which patients with cirrhosis should be offered operation. From the clinical point of view, portal decompression is considered potentially useful in three general categories of patients with cirrhosis: (1) those who have survived one or more hemorrhages; (2) those known to have cirrhosis and in whom x-ray examination of the esophagus has revealed varices from which, however, the patient has not bled; and (3) those in relatively good health whose primary problem is ascites that is not controlled by restriction

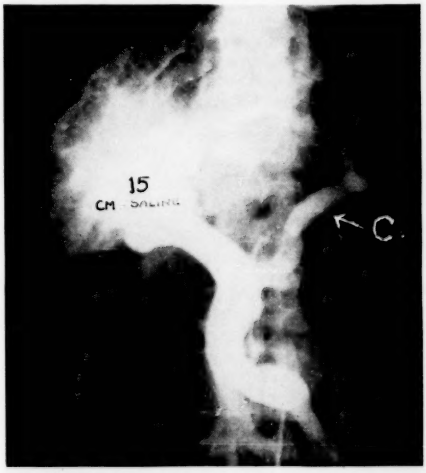

Fig. 3.—Operative portal venogram showing large coronary vein of stomach (C) in which the pressure was 15 cm. of saline solution.

of salt and by adequate dietotherapeutic measures. The last-mentioned group of patients may or may not have bled from their varices.

Probability of Surgical Mortality and Future Hemorrhage in Patients Who Have Bled.—Conventionally today, the accepted indication for portal decompres-

sion is esophagogastric hemorrhage. This thinking has been based upon two assumptions: first, that once a patient has bled from his varices he is likely to do so again and, second, that nonsurgical measures are of no avail. In other words, the presumption of future hemorrhage together with the conviction that severe hemorrhage inevitably threatens the lives of patients with cirrhosis has been the rationale behind attempting to prevent, by whatever means, further hemorrhage. Once a patient with cirrhosis has bled, the problem resolves itself into one of the probability of future hemorrhage. This probability must then be weighed not only against operative mortality but also against postoperative morbidity. This latter consideration, though less decisive than surgical mortality, cannot be disregarded, for it is difficult to point with pride to a patient who has survived his operation only to become a neuronutritional cripple whose future existence depends upon prolonged hospitalization.

Succinctly stated then, if the probability of hemorrhage is greater than the surgical mortality and morbidity, the patient should be offered portal decompression; conversely, if surgical mortality is greater than the probability of recurrent hemorrhage, operation should be withheld. Provided adequate data are available, it should be possible to express these probabilities mathematically and reach a logical conclusion about portal decompression.

Of the desired figures, those for surgical mortality are easiest to come by, for the data are clear-cut. If the mortality associated with acquiring experience with the operation of portal decompression be disregarded, it is evident from reviewing recent statistics on the subject that the figure is less than 10% and may be as low as 5%. In making this generality, it must be remembered that mortality will vary with the degree of selectivity employed with regard to hepatic function; if only good-risk patients are accepted for operation, mortality will be less than it would be if poor-risk patients are more regularly operated on. Nevertheless, for purposes of discussion, it seems unlikely that any great quarrel will be forthcoming if the surgical mortality rate accepted today is placed somewhere between 5 and 10%.

Turn now to the probability of future hemorrhage among patients who have bled one or more times. Omitting for the moment such intangibles as whether the patients refrain from drinking alcohol, whether they follow a sound dietary program, and their degree of liver damage, can the probability of further hemorrhage be as accurately determined as can the probability of death due to operation? Examination of such data as are available indicates that once a patient has bled his chances of bleeding again are high. For instance, among a group of 56 patients who survived a total of 120 hemorrhages during a cumulative total period of 80 years, the incidence of hemorrhage was one and one-half hemorrhages per year.[6b] To assign this probability a precise figure is not possible at the present time. The series is not large enough to provide a figure that is statistically significant. Comparable information is not available on a group of patients who have bled only once and who, having survived, have never bled again.

In sharp contrast to these data, it is conventional to advance the fact that 40 to 60% of patients with cirrhosis are dead within a month of their first hemorrhage. Furthermore, it is common practice to advance this percentage as an argument in favor of portal decompression among patients who have bled from their varices. Is it not legitimate to ask whether death or survival after operation can be validly compared to death or survival after first hemorrhage?

In brief then, data are apparently not readily available from which to determine accurately the probability of future hemorrhage in the patient with cirrhosis who has bled. If it be accepted that abstinence from alcohol and good dietotherapy can improve the status of the patient with cirrhosis and that the improvement may be associated with lessened intrahepatic resistance and subsidence of varices, it becomes even more difficult to predict what is going to happen to any given patient with one or more variceal hemorrhages. That he may bleed again appears likely, but whether this probability is greater or lesser than surgical mortality is not known. Many, of course, have persuaded themselves that the risk of future hemorrhage is greater than 5 to 10%, particularly among patients who cannot be persuaded to follow a hygienic way of life. For this reason, portal decompression continues to be a popular operation.

Viewing this therapeutic dilemma (which admittedly may be more implied than real) from its broadest point of view, one possible solution suggests itself. Clinics interested in this problem might profitably embark upon a long-term controlled program designed to determine the probability of future hemorrhage among patients with cirrhosis who have bled and who have been persuaded to follow a hygienic dietotherapeutic program. The most important feature of the study would be operating on the patients who are assigned even numbers in such a series, while retaining as controls the patients who are given odd numbers. Patients selected for study would have to be classified with great care in regard to their hepatic reserve, whether they abstained from alcohol, whether their hepatic dysfunction was reversible, and whether the varices of the patients who were not operated on subsided or persisted. At the end of 10 years, such a study would undoubtedly provide an answer to the perplexing problems presented today by the patient with cirrhosis who bleeds from his varices.

Prophylactic Shunts in Patients Who Have Not Bled from Their Varices.—The second general category of patients with cirrhosis who are, with increasing legitimacy, being considered candidates for portal decompression are those who, in the course of general study for their disease, are found to have esophagogastric varices but who have never bled from them. When portal decompression was first introduced, it was designed for the patient who had clearly demonstrated his tendency to hemorrhage. Certainly it was logical to explore the potential of portacaval shunts among this group first and reserve the problems of patients with varices who had not bled for a later date. As the success of portal decompression for controlling hemor-

rhage was demonstrated, it was inevitable that the question of the usefulness of "prophylactic shunts" would be raised.

In recent months several articles [7] on this aspect of portal hypertension and varices have appeared. They urge that a shunt be offered patients with varices—even though they have not bled. The major stimulus to such an attitude, of course, has been an appreciation of how serious even one hemorrhage in the life history of a patient with cirrhosis may be. If, therefore, it is appropriate to prevent repeated hemorrhages, is it not of even greater importance to prevent the first one? Teleologically little fault can be found with this reasoning, and shunts will undoubtedly be performed in increasing numbers in patients with varices who have not bled but whose hepatic reserve is reasonable.

The same unanswered questions must again be raised here: What is the probability of patients with cirrhosis developing varices? What is the probability of patients with varices bleeding at some period in the future when they have not demonstrated their tendency to bleed in the past? As far as can be determined, data upon which to answer such questions are unavailable. That some patients with cirrhosis will develop varices from which they will bleed is self-evident. Again, whether this probability is greater or lesser than the risk of operation is not known.

Therefore, the same opportunities for a controlled study exist among these patients as among those who have bled one or more times. In fact, there is even greater incentive to undertake such a study here than among those who have bled, because a number—small, to be sure, but still appreciable—of patients can be expected to develop neuronutritional difficulties after portal decompression. Were prophylactic shunts to be used widely among patients who have never bled, a certain number of such patients would be done a serious disservice. If ever it were permissible to plead strongly for a controlled study of any subject, it is with reference to prophylactic shunts.

Postoperative Morbidity.—Thus far in this discussion of patients who have been subjected to portal decompression, serious reference to postoperative morbidity has been omitted. There can be little doubt that incapacitating neuronutritional deficits develop after portal decompression has been performed.[8] Ellis and co-workers [6c] estimate that this occurs in 11% of patients with cirrhosis after splenorenal shunts and in 27% after the portacaval variety of decompression. In our experience, this distressing complication has occurred in about 18% of patients after end-to-side portacaval shunts.

By arguing by analogy from the experimental dogs with Eck's fistula and from the one patient of McDermott and Adams [9] with a normal liver in whom an Eck fistula was performed, it has been customary to ascribe the untoward complication of neuronutritional deficits to the fistula itself. In addition, the complication is believed to bear some as yet ill-defined relationship to the type of shunt employed. Even careful analysis of the patients who develop episodic stupor after portal decompression fails to establish clearly whether this syndrome should be ascribed to the shunt itself or to progressive hepatic deterioration. If it were due to the shunt, it should appear with greater frequency in the postoperative course. As the *New England Journal of Medicine* observes editorially,[10] this consideration is of particular importance if any considerable number of patients with varices who have not bled are to be subjected to portal decompression. Converting an essentially well individual to a confused, lethargic, and even stuporous patient is hardly desirable, despite the worthiness of wishing to prevent a potentially catastrophic hemorrhage.

Portal Decompression for Ascites

The next problem meriting discussion concerns portal decompression for intractable ascites. For many years it was held that this complication of cirrhosis arose from the congestion in the splanchnic portal bed. In his original article, Eck had no thought of controlling variceal hemorrhage by means of his fistula. Rather did he express the belief that one day his shunt might prove useful in man for the relief of ascites.[11] In fact, the one or two successful shunts performed in human beings during the early part of this century were for this purpose. A natural sequel, therefore, to Whipple and Blakemore's original work on portal decompression for hemorrhage was an attempt to control ascites by the same means. Unfortunately, patients were ill-chosen and mortality was prohibitively high. Soon, therefore, this use of the Eck fistula fell into disfavor and was abandoned.

Another argument against portal decompression for ascites was borrowed from patients with extrahepatic block. Here, ascites is rarely, if ever, encountered in spite of the fact that levels of increased portal pressure comparable to those seen in cirrhosis are not uncommon. Furthermore, the collection of ascites in the presence of a widely patent shunt has become a well substantiated observation. With Mallet-Guy's [12] and Hyatt and Smith's [13] demonstrations that experimental canine ascites derives from the surface of the liver, a relationship between ascites and splanchnic portal hypertension appeared more remote than ever.

In spite of this discouraging information a few people retained their interest in portal decompression for ascites. From time to time there appear patients with cirrhosis and ascites who are in general good health and whose ascites does not subside on a limited salt intake. The course of such a patient is outlined in the following case report:

Case 3.—A 45-year-old female was admitted to the hospital with a long history of high daily alcoholic intake complicated by progressive enlargement of her abdomen due to ascites. The ascites was not controlled by restricting sodium intake or by diet. The patient had never sustained esophagogastric hemorrhage, nor had she ever complained of edema of her legs and feet. Her serum bilirubin level was 0.3 mg. per 100 ml., and repeated serum albumin levels varied from 3.8 to 4.0 gm. per 100 ml. At operation, a portacaval shunt reduced her portal pressure from 35 cm. to 18 cm. of saline solution. Postoperatively she did well, and 21 months after the operation the ascites had not reappeared.

Recently Nickel and Eisenmenger [14] reexplored the usefulness of portal decompression for ascites intractable to other forms of therapy. Persuaded that ascites is not solely a phenomenon of hypoalbuminemia and

that sodium and water retention may, under certain circumstances, be secondary rather than primary, these investigators operated on five patients with ascites uncontrolled by dietotherapy and a low-sodium intake. Their report is stimulating indeed, for in each instance ascites disappeared after completion of a successful portacaval shunt. In view of these recent observations, the usefulness of portal decompression in ascites should be reconsidered, particularly in patients whose collections of abdominal fluid do not subside within a reasonable time on a restricted sodium intake and who are otherwise in reasonably good health.

Neuronutritional Deficits in Patients with Cirrhosis

For many years varying degrees of coma have been recognized as a serious complication of advanced hepatic disease. At one time this was thought to be invariably fatal. Recently, however, attitudes have changed toward hepatic coma, and today many patients recover as a result of assiduous medical and nursing care. That this neurological deficit may be precipitated by massive esophagogastric hemorrhage is well known. Whether the varying degrees of coma and stupor that follow a bleeding episode are due to hypoxic damage to the liver, to blood in the gastrointestinal tract, or to some other as yet unappreciated factor has not been determined.

Recent interest in the nitrogen metabolism of such patients has demonstrated that this type of stupor bears a more or less direct relationship to elevated concentration of ammonia in the blood. This has been correlated with a characteristically abnormal electroencephalographic pattern. These observations, together with knowledge of meat intoxication in dog and in man after an Eck fistula, have led to a number of speculations on the possible adverse neuronutritional effects of shunting the portal blood of a patient with advanced liver disease into his systemic circuit.

Present opinion is spread all the way from those who believe that portal decompression should never be done to those who maintain that a shunt even in the presence of liver disease is of no consequence so far as postoperative neuronutritional deficits are concerned. Those who oppose portal decompression hold that patients with or without liver disease subjected to a shunt will ultimately present the picture of meat intoxication. In addition, this same group, reasoning from animal experiments, insists that the liver of man with cirrhosis may lose its capacity to regenerate when portal blood is shunted into the vena cava inferior. Supporters of portal decompression point out that patients with extrahepatic block and complete bypass of the liver by portal blood (fig. 4) never develop coma or episodic stupor. Furthermore, many patients have survived portal decompression for many years without either symptoms or laboratory evidence of ammonia intoxication. (The young woman whose portal venogram appears in figure 4 maintained a good state of nutrition without evidence of ammonia intoxication.) Supporters of portal decompression also uphold the belief that in man with liver disease an Eck fistula does not necessarily lead to faulty ammonia metabolism.

Final resolution of these points of view seems impossible at present, but a number of thoughts concerning the nature of hepatic coma have evolved. One of the most interesting has been the thesis of McDermott and co-workers[85] that the various forms of hepatic coma do not necessarily reflect identical biochemical phenomena. They propose, therefore, two general classifications of the phenomenon: first, spontaneous encephalopathy, represented by patients in hepatic failure in which an elevated level of ammonia in the blood is but one of a number of poorly understood metabolic disorders, and second, exogenous hepatic coma, in which ammonia intoxication is proposed as the sole cause.

They advance two arguments in favor of such a differentiation. The first is that the patient with exogenous coma responds satisfactorily to L-glutamic

Fig. 4.—Operative portal venogram, obtained in young woman with portal venous thrombosis, showing that all portal blood bypasses her liver.

acid therapy as well as to removal of the cause, such as blood in the gastrointestinal tract, ill-advised administration of ammonia compounds, or excessive protein intake. The second is that in spontaneous encephalopathy the benefits of L-glutamic acid are negligible. In addition, a precipitating cause that can be removed is rarely found. In the spontaneous type associated with advanced liver disease, levels of ammonia in the blood do not decline after any form of therapy. In exogenous coma, however, appropriate treatment is associated with a gratifying subsidence to normal of high levels of ammonia in the blood.

Among candidates for portal decompression, these concepts are particularly significant. During or immediately after hemorrhage the intestine may be laden with blood; this contributes significantly to high levels of ammonia in the blood and consequent coma. Although apparently drastic and of some pos-

sible danger in shock, purging and enemas should be used freely to rid the intestinal tract of such blood. Rapid emergence from coma with precipitous falls in ammonia levels in the blood are well known to occur after such treatment. In preparing patients who have stopped bleeding for operation, particular care must be exercised in order to avoid the administration of such drugs as ammonium chloride and to limit protein intake to 50 gm. until assured that greater amounts can be tolerated. More study and investigation will have to be undertaken before the complex relationship between Eck's fistula, episodic stupor, and hepatic failure in man is clarified.

In our experience it has been discouraging to record the cases of three patients who tolerated a 120-gm. protein diet perfectly prior to operation but who, after an end-to-side portacaval shunt, have not been able, over a period of several months, to ingest more than 40 to 50 gm. daily. It is a temptation, of course, to hold the shunt responsible. Careful study, however, revealed that the operation itself apparently seriously depleted hepatic reserve in the patients. Postoperatively they have had jaundice and have been unable to maintain a serum albumin level of more than 2.8 gm. per 100 ml.

Type of Shunt for Control of Esophagogastric Hemorrhage

Early in the development of portal decompression a variety of shunts were tried. Small vessel shunts were abandoned early because of thrombosis. The first shunt

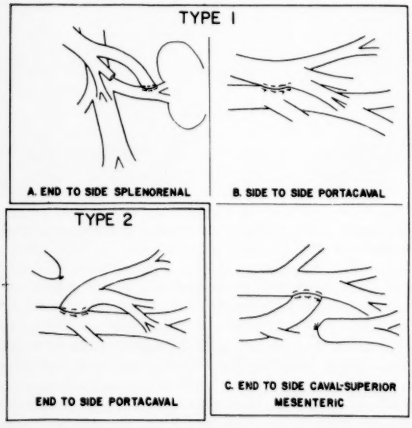
TYPE 1
A. END TO SIDE SPLENORENAL
B. SIDE TO SIDE PORTACAVAL
TYPE 2
END TO SIDE PORTACAVAL
C. END TO SIDE CAVAL-SUPERIOR MESENTERIC

Fig. 5.—Hemodynamic varieties of portacaval shunts.

that held major promise was an anastomosis between the end of the splenic vein and the side of the renal vein. Simultaneously with the development of splenorenal anastomoses, a number of surgeons interested themselves in a direct portacaval shunt in either the side-to-side or the end-to-side position. Needless to say, each of these shunts has its advocates. Advantages and disadvantages have been claimed for each. Unfortunately an insufficient number of physiological observations have been made of them to permit any final conclusions as to their absolute merits. However, in spite of numerous gaps in knowledge with regard to shifts in portosystemic dynamics when a fistula is created between the portal and systemic venous systems, it is possible to comment upon a few of the changes that can be observed. Most of these observations are made at the operating table and must not be presumed to persist unmodified after the patient's recovery.

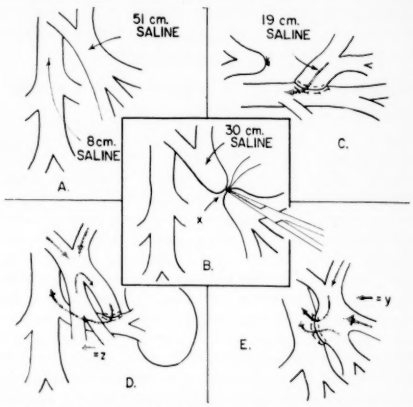

Fig. 6.—Direction of blood flow in cirrhosis of liver after various types of portal decompression. *A*, portal hypertension of 51 cm. of saline solution. *B*, intrahepatic portal pressure of 30 cm. of saline solution. In order to obtain this figure the portal vein was occluded for 10 minutes at point x. *C*, reduced portal pressure to 19 cm. of saline solution obtained by an end-to-side portal anastomosis. Had either a splenorenal, *D*, or a side-to-side portacaval, *E*, shunt been performed, it is reasonable to assume that blood would of necessity flow from the liver through the shunt into the vena cava inferior.

Hemodynamically there appear to be only two types of shunt. The first includes the end-to-side splenorenal, the side-to-side portacaval, and the end-to-side caval-superior mesenteric.[3] The second is the end-to-side portacaval shunt (fig. 5). The basic difference between these two types of shunt is, of course, that in the first type (splenorenal, side-to-side portacaval, and end-to-side caval-superior mesenteric) access both to the liver and to the vena cava inferior is provided portal blood by way of the shunt. Conversely, blood from the portal bed cannot gain access to the liver in the end-to-side portacaval shunt; it must all drain into the vena cava inferior.

Examination of the first varieties of shunt discloses that the direction in which hepatic or splanchnic blood will flow will depend upon the pressures that exist in the several components of the shunt after it has been opened. Thus, if the pressure on the hepatic side of the shunt is higher than that on the splanchnic side, blood will flow out of the liver into the vena cava inferior. If it is the reverse, blood can be presumed to flow from the splanchnic bed partially through the shunt and

partially through the liver (fig. 6). The reason for this point relates to the intimation made time and time again that a splenorenal or side-to-side portacaval shunt is more desirable than an end-to-side portacaval anastomosis, because it permits a certain increment of portal blood to gain access to the liver. Portal blood, therefore, is permitted to fulfill its destiny in a manner intended by nature. The incidence of adverse effects upon the liver is presumed less than it is when the liver is deprived of portal blood.

That such inferences may not be true readily becomes apparent from the following observations. In nine patients with cirrhosis, the portal vein was occluded for 10 minutes and the pressure measured between the point of occlusion and the liver (fig. 6*B*). These values varied from 17 to 30 cm. of saline solution and in each instance were higher than portal pressure measured in the superior mesenteric vein after opening the shunt (fig. 6*C*). Should such relationships persist they can only be interpreted to mean that in these nine patients at least blood in the intrahepatic portal venous bed drains out of the liver prior to traversing the sinusoids. The highest of these hepatic portal pressures supports the observation made many times that, as cirrhosis develops, hepatic arterioportal venous shunts increase in number until the liver, in effect, becomes the site of innumerable arterioportal venous fistulas.

Whether such an effect is intensified or lessened when the patient assumes the upright position or whether these hemodynamic relationships persist indefinitely is, of course, not known. Until such additional facts are learned about postportal decompressive dynamics, it is improper to assume that portal blood will pass through the liver just because a side-to-side portacaval or splenorenal shunt is employed for decompression. Whether draining hepatic arterial blood out of the liver in two directions at once is beneficial or harmful must remain a matter of speculation until additional facts can be obtained. In the end-to-side portacaval shunt splanchnic blood cannot gain access to the liver nor can hepatic arterial blood drain backward through the shunt.

As far as the success of the two major varieties of shunt is concerned, the end-to-side portacaval shunt is generally considered to be more effective in preventing recurrent hemorrhage. The lesser success of the splenorenal shunt has been widely attributed to greater technical difficulties encountered in fashioning the shunt itself. It has occurred to some, however, and particularly to Julian [15] that additional factors other than technical may be involved. For instance, it seems reasonably well substantiated that portal pressure may vary with exacerbation and remission of the patient's cirrhosis. It follows that during a remission portal pressure may fall and a greater amount of portal blood pass through the liver than through the shunt. With lesser demand placed upon it, a none too large splenorenal or side-to-side portacaval shunt might well shrink appreciably. With cirrhotic recrudescence such a shunt might prove inadequate. The end-to-side portacaval shunt, however, bears the entire burden of splanchnic venous drainage from the moment the shunt is opened. Perhaps some such mechanism as this militates against the permanent success of a splenorenal shunt when compared with an end-to-side portacaval.

Another criticism of the end-to-side portacaval shunt is its failure to relieve an associated hypersplenism. Although specific data upon the hematological effect of direct portacaval shunts are not yet available, the average congested spleen shrinks remarkably in size within a few months after the shunt is opened. Coincident with this decrease in the size of the spleen, the white blood cell and blood platelet counts rise substantially. Furthermore, in our series of some 75 end-to-side portacaval shunts for cirrhosis, splenectomy has not become necessary at a later date.

Preoperative and Postoperative Management

There have been important advances made toward better understanding and management of the metabolic defects that are characteristic of patients with bleeding varices due to cirrhosis. Although jaundice, hepatic coma, and wasting ascites have long been recognized as ominous prognostic signs in patients with cirrhosis, little was done therapeutically for such patients other than to relieve their discomfort by paracentesis. In most instances, this probably hastened death rather than prolonged life. In 1905, Herrington and Hadfield reported a series of patients with ascites treated by salt deprivation, and in 1910, Gilbert recognized that urinary output was decreased in patients with cirrhosis. However, only during the past decade or so have many investigators demonstrated that by restricting sodium and by an appropriate diet hepatic compensation can often be achieved. In addition, a better understanding of the importance of avoiding paracentesis, of the usefulness of concentrated human serum albumin, and of the significance of rest and abstinence from alcohol have all contributed to rehabilitating the patient with advanced cirrhosis.

From the reports of the many investigators working on cirrhosis, it is clear that patients with this disease suffer from salt, water, and even hormonal imbalances. Whether this is primary or secondary to the cirrhosis is not yet known, and to review here all of the evidence available would carry the discussion far beyond its intended scope. Current opinion, however, is well summarized by Eisenmenger and Nickel [14]:

> An increased amount of pituitary antidiuretic hormone may account for the renal retention of water which permits the accumulation of ascites; that this excessive antidiuretic activity is a secondary factor seems probable from the observation that the water retained in the advanced case of cirrhosis is localized as ascitic fluid and is not retained as generalized edema. Also, the renal retention of sodium, presumably stimulated by the adrenal gland, is only enough to provide sufficient sodium for the ascites retained and to maintain normal levels of sodium in the other body fluids.

No matter how the complex problems are ultimately resolved, surgeons are in a far better position than ever before to manage the patient with cirrhosis who is in need of portal decompression. In fact, the success of portal decompression may relate as much to improved medical care as to the operation.

The practical application of these metabolic principles to the patient with cirrhosis who needs operation has appeared in two stages. Early in the history of portal decompression certain arbitrary criteria were established. It was generally held that a given patient should be refused operation if he had ever been in coma, if he had ascites, if his serum albumin level were below 3.5 gm. per 100 ml., and if his serum bilirubin level were 1.5 mg. per 100 ml. or above. Not long after the development of these criteria, it became evident that if they were too rigidly applied a number of patients standing to benefit materially from operation would be refused surgical treatment. On the other hand, if these criteria were compromised, operative mortality increased sharply. Appreciation of these facts, together with the realization that with appropriate dietotherapy even advanced hepatic decompensation could frequently be reversed, led to longer and more careful preoperative preparation. It is this effort

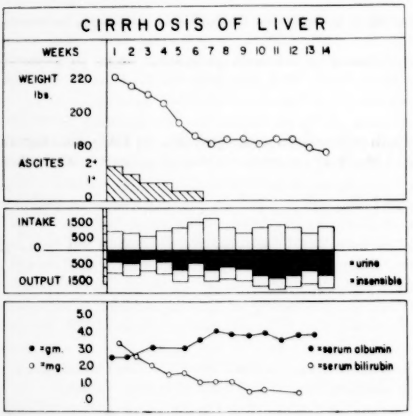

Fig. 7.—Laboratory data on patient with apparently advanced cirrhosis of the liver, showing marked improvement that may take place as a result of preoperative dietotherapy, bed rest, and salt restriction. Ascites regressed, serum bilirubin level declined, and serum albumin level rose appreciably.

that not only has served to make available to an additional group of patients the benefits of portal decompression but also has reduced more than anything else postoperative morbidity and mortality to its currently acceptable levels. In brief, adequate preoperative preparation means a period of weeks or even months on a low-sodium, high-caloric, high-protein diet from which alcohol is rigidly withheld. The patient whose laboratory data are shown in figure 7 tolerated portal decompression uneventfully.

Summary and Conclusions

Many authorities have proved that successful portal decompression is followed by freedom from recurrent variceal hemorrhage. As the operation has been developed, however, a number of problems have inevitably arisen. These are urgently in need of solution if portal decompression is to either win a permanent place in surgical therapy or be discarded. The precipitating factors in variceal hemorrhage need to be identified. Whether portal hypertension is in itself deleterious to the patient has not been defined. Better methods for the immediate control or even prevention of variceal hemorrhage are needed. The best operation for patients with extrahepatic block to whom a shunt is unavailable has not been decided.

The probability of hemorrhage and death among patients with varices who have and who have not bled is not known, nor are data immediately available from which this urgently needed probability can be determined. Although such information would be highly desirable for patients who have bled, determination of this probability is a necessity if those with varices who have not bled are to be treated appropriately. Here, particularly, a controlled study is of great importance. The usefulness of portal decompression for intractable ascites needs to be reevaluated. The relationships between cirrhosis, neuronutritional deficits, and the various types of portacaval shunts need further study and clarification. Finally, it must be recognized that the medical treatment of cirrhosis has improved greatly over the past 10 years. The impact of this upon the surgical treatment of variceal hemorrhage must, without question, be critically evaluated.

Addendum

The young woman with portal venous thrombosis whose preoperative and postoperative esophagrams appear in figure 2 and who did not bleed during a follow-up period of five years bled massively on one occasion five and one-half years after the limited esophagogastrectomy.

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References

1. Whipple, A. O.: Problem of Portal Hypertension in Relation to Hepatosplenopathies (E. Starr Judd Lecture), Ann. Surg. **122**:449-473 (Oct.) 1945.

2. Chiles, N. H.; Baggenstoss, A. H.; Butt, H. R.; and Olsen, A. M.: Esophageal Varices: Comparative Incidence of Ulceration and Spontaneous Rupture as Cause of Fatal Hemorrhage, Gastroenterology **25**:565-573 (Dec.) 1953.

3. Clatworthy, H. W.; Wall, T.; and Watman, R. N.: New Type of Portal-to-Systemic Venous Shunt for Portal Hypertension, A. M. A. Arch. Surg. **71**:588-595 (Oct.) 1955.

4. Hallenbeck, G. A., and Shocket, E.: Treatment of Bleeding Esophageal Varices After Splenectomy, A. M. A. Arch. Surg. **71**:581-587 (Oct.) 1955.

5. Crile, G., Jr., in discussion on Hollenberg, H. G., and Briggs, B. P.: Porta Caval Anastomosis in Infants, Ann. Surg. **141**:642 (May) 1955.

6. (*a*) Blakemore, A. H.: Portacaval Shunting for Portal Hypertension, Surg. Gynec. & Obst. **94**:443-454 (April) 1952. (*b*) Child, C. G.: The Shattuck Lecture: Portal Circulation, New England J. Med. **252**:837-850 (May 19) 1955, (*c*) Ellis, D. S.; Linton, R. R.; and Jones, C. M.: Effect of Venous-Shunt Surgery on Liver Function in Patients with Portal Hypertension: Follow-up Study of 125 Patients Operated on in Last 10 Years, ibid. **254**:931-936 (May 17) 1956.

7. Welch, C. S., and others: Treatment of Bleeding from Portal Hypertension in Patients with Cirrhosis of Liver, New England J. Med. **254**:493-502 (March 15) 1956. Palmer, E. D.;

Brick, I. B.; and Jahnke, E. J., Jr.: Esophageal Varices Without Hemorrhage in Cirrhosis: Proper Indication for Shunting Procedures, ibid. **250:**863-865 (May 20) 1954.

8. (*a*) Havens, L. L., and Child, C. G.: Recurrent Psychosis Associated with Liver Disease and Elevated Blood Ammonia, New England J. Med. **252:**756-759 (May 5) 1955. (*b*) McDermott, W. V., Jr.; Wareham, J.; and Riddell, A. G.: Treatment of "Hepatic Coma" with L-Glutamic Acid, ibid. **253:**1093-1102 (Dec. 22) 1955.

9. McDermott, W. V., Jr., and Adams, R. D.: Episodic Stupor Associated with Eck Fistula in Human with Particular Reference to Metabolism of Ammonia, J. Clin. Invest. **33:**1-9 (Jan.) 1954.

10. Prophylactic Portacaval Shunts for Esophageal Varices, editorial, New England J. Med. **254:**532-533 (March 15) 1956.

11. Child, C. G.: Eck's Fistula, Surg. Gynec. & Obst. **96:**375-376 (March) 1953.

12. Mallet-Guy, P.; Devic, G.; Feroldi, J.; and Desjacques, P.: Étude expérimentale des ascites: Sténoses veineuses post-hépatiques et transposition du foie dans le thorax, Lyon Chir. **49:**153-172 (Feb.-March) 1954.

13. Hyatt, R. E., and Smith, J. R.: Mechanism of Ascites, Am. J. Med. **16:**434-448 (March) 1954.

14. Eisenmenger, W. J., and Nickel, W. F.: Relationship of Portal Hypertension to Ascites in Laennec's Cirrhosis, Am. J. Med. **20:**879-889 (June) 1956.

15. Julian, O. C.: Choice of Operation in Portal Hypertension, editorial, Surg. Gynec. & Obst. **100:**753-754 (June) 1955.

MANAGEMENT OF HEMORRHAGING GASTRODUODENAL ULCER

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• *Team management, with a team composed of representatives of the specialties of gastroenterology, hematology, surgery, radiology, and clinical laboratory services can provide the best treatment for the patient with gross gastrointestinal bleeding. Exact diagnosis, including the general condition of the patient, has shown that, while peptic ulcer is the most common cause of gastrointestinal bleeding, in 134 of 285 cases the site of hemorrhage occurred in other regions. Having a "bleeding team" available at all times to act in an advisory capacity appears to be the best approach in reducing the mortality of the bleeding patient, especially when he is admitted as an emergency case. While all patients should have an initial trial on medical management, those who continue to bleed or in whom bleeding recurs should be considered for prompt surgical intervention.*

It is the purpose of this report to discuss the treatment of patients with bleeding ulcer, particularly from the standpoint of "team management" as we experienced it in a large city teaching hospital. Feeling that we needed a better plan of management for the patient with gastrointestinal bleeding as seen on our wards, we formed a "bleeding team" at the Jefferson Hospital approximately four years ago, with representatives from the divisions of gastroenterology and hematology and from the surgical A, surgical B, radiologic, and clinical laboratory services. According to our plan, all patients with gross gastrointestinal bleeding coming to the receiving ward were transferred to the medical ward, where they were seen promptly by a resident especially assigned to the bleeding team. After obtaining a history and performing a physical examination consistent with the patient's condition, he would notify, at any time of the day or night, all members of the team or their designated representatives. In general, it was agreed that each patient would be treated medically unless he continued to bleed or started to bleed again after a period of cessation; under such circumstances he would be considered a candidate for prompt surgical intervention.

Evaluation and Diagnosis of Patient's Condition

It is generally recognized that massive bleeding in the elderly patient is a major emergency requiring prompt treatment. Ordinarily less attention is given to the patient with mild to moderate bleeding, but we are impressed with the need for giving equal attention to such an individual because of the frequency with which recurrent bleeding may throw him into shock a few hours after hospital admission. Experience has shown that the majority of the patients are admitted during the early or late evening, when a reduction in staff and in routine facilities adds to the confusion of management. It is for this reason, as much as any other, that a systematic plan of management, with which all hospital personnel are familiar, should be set up by the bleeding team.

It is essential to know the severity and site of bleeding as early as possible; consequently, the first step in evaluating the condition of a patient admitted for gastrointestinal bleeding is to determine if he is in shock from blood loss. We depend considerably upon the blood pressure and pulse rate and have arbitrarily set a systolic pressure of 90 mm. Hg or below and/or a pulse rate of 110 beats per minute or above as indicative of incipient shock and of the need for blood replacement. It should also be borne in mind that there are patients who, even though they suffer great blood loss, fail to manifest tachycardia or a fall in the systolic pressure but will show gradual widening of the pulse pressure.

The general condition of the patient also offers valuable diagnostic information: pallor; a cold, moist skin; air hunger; thirst; and restlessness are important

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secondary signs of bleeding. The hematocrit, although routinely performed, is rarely an index of the blood loss because of wide shifts of fluids between the tissues and the vessels during an acute hemorrhage. We have determined blood volume with the use of Evans blue dye but have not found this to be a practical aid in determining the patient's need for blood under the emergency conditions.

The next important step is one of exact diagnosis. Although peptic ulcer is the commonest cause of gastrointestinal bleeding, it will be seen in table 1 that it occurred in 151, or only a little over one-half, of the 285 patients seen by our bleeding team. It is possible that the number of those whose regional diagnosis is listed as site unknown bled from superficial ulceration or erosion; however, this was definitely established in only three patients who came to surgery. It is obvious that there are many causes for serious bleeding other than ulcer and that definitive diagnosis is an important preliminary to treatment. The majority of the patients with bleeding admitted to our wards are unable to give a history that permits definite diagnosis. Therefore, a thorough physical examination is performed, with a special search made for the presence

TABLE 1.—*Regional Diagnosis of Condition Causing Gross Gastrointestinal Bleeding in 285 Patients*

Peptic ulcer	151
Esophageal varices	43
Unknown site	32
Other sites	30
Neoplasm, stomach	14
Hiatal hernia	9
Blood dyscrasias	6
Total	285

of icterus, purpura, angiomas of the skin, hepatosplenomegaly, and lymphadenopathy. Also, the condition of the gums and the mucous membranes of the mouth is carefully observed. The perineum is inspected, and a digital rectal examination is performed regularly, with benzidine testing of the stool to confirm the presence of melena.

If the history of hematemesis is not well established, a Levin tube should be passed to aspirate the gastric contents. For all practical purposes the presence of gross blood in the stomach establishes the bleeding site somewhere proximal to the ligament of Treitz. This is of particular diagnostic importance when x-ray study fails to show a lesion. When stigmas are present suggesting portal hypertension with esophageal varices as the site of bleeding, a tube of the Tocantins or Sengstaken type fitted with a balloon for tamponade should be passed. This permits compression of the varix, aspiration of the stomach contents, and, if desired, the introduction of liquid feedings. If blood can still be aspirated after one to two hours' use of tamponade, the bleeding point should be suspected to be below the esophageal varix, although occasionally inadequate tamponade may produce this. It should be recalled that the incidence of peptic ulcer in the cirrhotic patient is approximately three times that in the noncirrhotic patient and that ulcer can often be the site of bleeding even when large varices are present in the esophagus. Under these circumstances the use of a tube with balloon tamponade may be of great assistance in arriving at a correct diagnosis.

Urinalysis, blood typing and cross matching, and taking of a complete blood cell count and sulfobromophthalein sodium retention liver function test are the emergency laboratory procedures that should be available at all times. The sulfobromophthalein sodium test has been of considerable aid to us in evaluating the patient in whom cirrhosis of the liver is suspected. We give 2 mg. of the dye per kilogram of body weight; normally all dye will be removed from the blood within 30 minutes. Of 100 consecutive patients tested by us, 24 had retention of 12 to 50%. Liver disease was confirmed clinically, by needle biopsy or at autopsy, in 20 patients; in one patient cirrhosis was suspected but not proved, in 3 the reading of the test may have been in error, as in each of these a repeat test failed to show retention and the patients did not appear clinically to have hepatic disease. From our continued experience with this test, we feel that only rarely will it be positive when the patient has a normal liver but that hemorrhage superimposed on underlying hepatic disease will produce dye retention. The taking of an electrocardiogram and a serum amylase determination are required at times on an emergency basis, but determination of the blood urea nitrogen level and carbon dioxide—combining power and electrolyte studies are performed the following day when indicated.

All of our patients in whom the bleeding was suspected to be arising proximal to the ligament of Treitz had an x-ray study of the upper gastrointestinal area as soon as their condition permitted. The condition of the majority of the patients was stabilized and they were free of shock within 12 to 15 hours; thus they could be studied the morning after admission. Selective positions of the patient and air contrast studies were used, with avoidance of undue pressure or manipulation of the abdomen.

Esophagoscopy and gastroscopy were employed in selected cases when x-ray study failed to show a lesion. Up to the present time, we have not performed these studies routinely at the time of the patient's admission, as has been reported by others.[1]

Medical Management

The actual treatment of the patients remained under the supervision of the attending staff physician, resident, and intern in charge of the ward on which the patient was located. No attempt was made to place the treatment, either medical or surgical, exclusively in the hands of the team members. The primary function of the team was to establish the plan of management, make specific recommendations for treatment, follow the course of the patient, and analyze the results at periodic meetings.

All of our patients were given an initial trial on medical management, which included whole blood transfusions when indicated, bed rest, sedation, and early feeding. Since most of the patients are free of pain but are very apprehensive, we prefer to avoid the use of narcotics and to give to the average adult

120 mg. of phenobarbital sodium intramuscularly every six hours. Alkalies and anticholinergics were rarely employed. The use of the latter did not appear to contribute enough to outweigh the potential side-effects on the cardiovascular and urinary systems, particularly in persons in the older age group. Oxygen by nasal catheter or tent was administered when indicated. Dehydration and urinary output were used as guides for fluid and electrolyte administration. As soon as the patient was free of nausea and asked for food, he was given 1 oz. (28 gm.) of milk hourly, with a gradual increase in the volume or tube feedings as is described in a following section; soft foods were added promptly according to the tolerance of the patient. After maximum improvement of the patient, elective surgery was recommended, based essentially upon the age of the patient and the frequency of complication of his ulcer. Operation was rarely recommended in a patient under 40 years of age in whom there was not a history of repeated complication.

When bleeding from the ulcer continued or recurred in spite of supportive measures, the patient was immediately considered a potential candidate for prompt surgical intervention. This decision forms the crux of team management, because we have observed, as have others, that mortality rises very sharply in those patients who continue to bleed or start to bleed again after admission to the hospital, particularly when they are 45 years of age or over. Consequently, these patients were kept under constant observation during their hospital stay, and, if bleeding recurred, prompt reevaluation of the condition followed.

Comparative Results in Patients Treated Medically and Surgically

Of 151 patients with ulcer observed by the team, 92 were treated exclusively medically, with a mortality rate of 18.3%, and 59 were treated surgically, with a mortality rate of 15.2% (table 2). It will also be observed that the mortality in patients with gastric ulcer treated medically is more than twice (percentagewise) that in patients with duodenal ulcer treated medically. Patients with marginal ulcer responded well to both medical and surgical treatment. These mortality rates are undoubtedly high, but it should be emphasized that this is a series of consecutive patients without exclusion for any reason.

TABLE 2.—*Number of Patients with Ulcer Treated Medically and Surgically and Number of Deaths Occurring*

Condition	Patients Treated, Total No.	Medical		Surgical	
		Patients Treated, No.	Deaths, No.	Patients Treated, No.	Deaths, No.
Duodenal ulcer	112	68	10	44	8
Gastric ulcer	28	16	6	12	1
Marginal ulcer	11	8	1	3	0
Total	151	92	17	59	9

The patients were admitted from all strata of society; were beyond the fifth decade of life, except in two instances; and suffered from massive, continued, or recurrent bleeding in each instance in which death occurred. Some of the patients had been bleeding for three to four days prior to their admission to the hospital, and many others had complications in other body systems, including cerebrovascular accident, coronary occlusion, uremia, and cirrhosis (table 3). Conditions in which bleeding occurred after the administration of cortisone acetate or corticotropin proved exceptionally refractory to treatment (table 3).

TABLE 3.—*Factors Contributing to Death in Patients with Ulcer Treated Medically and in Those Treated Surgically*

	Duodenal Ulcer	Gastric Ulcer	Marginal Ulcer
Patients Treated Medically			
Delay	2		
Myocardial infarction	2	1	
Cirrhosis with perforation	2	1	
Uremia	2	1	1
Cardiovascular accident	1		
Raynaud's disease (cortisone given)	1		
Cirrhosis (cortieotropin given)		1	
Congestive heart failure		2	
Patients Treated Surgically			
Emergency			
Open duodenal stump	1		
Pancreatitis	1		
Lymphosarcoma (cortieotropin given)	1		
Dermatomyositis (corticotropin-cortisone given)	1		
Interval			
Postoperative bleeding	2		
Delay	2		
Congestive heart failure		1	

It is likely that mortality rates vary according to the social grouping, with those patients from the better economic levels showing lower rates. Of 205 private patients with ulcer seen by us, 41 had severe to massive bleeding. There were no deaths in the 27 patients treated medically. Fourteen patients were operated on (subtotal gastric resection): seven had emergency surgery and seven elective surgery. Two patients, both in their sixth decade, died after emergency surgery was performed because of continued bleeding; at autopsy, it was found that one had acute hemorrhagic pancreatitis and the other massive pulmonary embolus.

A recent review of a large number of patients with bleeding duodenal ulcer treated at the Lahey Clinic, Boston, showed a medical mortality rate of 2.1% and a surgical mortality rate of 1.6%. It is of interest that these were all private patients who came from an upper economic level and who were, for the most part, without the multiple complications seen in the type of patients admitted to the wards of a general city hospital.[2]

If the mortality rate reported in our series were based only on the deaths from exsanguinating ulcer and not on those due to major complications, the net incidence would be 2.5% (2 out of 77) in those patients treated medically and 11% (6 out of 53) in those treated surgically (table 4.). This emphasizes the serious significance of bleeding in older patients with complications and probably represents at least one explanation for the wide difference in mortality rates in various reports.

In table 5 the patients are divided into three groups according to the periods during which they received treatment. During the first two years, 1952-1953, there were 44 patients who were treated medically for bleeding duodenal ulcer, with six deaths, a mortality incidence of 14%. Of these six patients, there were two

who probably could not have been saved under any circumstances. One was a 37-year-old female with uremia, and the other was a 78-year-old man who suffered from massive gastrointestinal bleeding after a transurethral resection for benign hypertrophy of the prostate. Twenty-four hours after the operation, as a result of a cerebral vascular accident, he went into coma. Of the four remaining patients, in two there was probably unjustified delay in undertaking surgery for recurrent bleeding. The other two patients were in their fifth decade and suffered from associated myocardial infarction, which precluded surgical treatment; bleeding could not be permanently checked by any medical measures employed.

TABLE 4.—*Comparison of Mortality Rates, Medical and Surgical, Based on Deaths due to Major Complications and Based Only on Deaths due to Exsanguinating Ulcer*

	Medical			Surgical		
	Patients Treated, No.	Deaths		Patients Treated, No.	Deaths	
		No.	%		No.	%
Gross mortality	92	17	18.3	59	9	15.2
Net mortality	77	2	2.5	53	6	11.0

Of the 11 patients treated surgically during the two-year period 1952-1953, 2 died, thus giving a mortality rate of 18%. It is seen that six had emergency surgery within 48 to 72 hours, and five had interval or elective surgery. Of the two patients who died, one, who was operated on electively, had complications of pneumonia and pulmonary embolus; the other one, after emergency surgery, was found to have associated cirrhosis not previously recognized.

The next year, 1954, the medical mortality rate reached 25%. Of the three patients who died, one was 78 years of age and never had been considered to be in a condition that would warrant surgical intervention. The second patient had complications of cerebrovascular accident, myocardial infarction, and cirrhosis; the third had cirrhosis and a penetrating ulcer, which, at autopsy, was found to be of such size and adherence that it could not have been separated from the bed of the liver. The surgical mortality was also high that year (18%), with one patient dying from peritonitis that resulted from a ruptured duodenal stump and a second having a fulminating hemorrhagic pancreatitis that developed postoperatively. The third death was that of a patient who was an extremely poor surgical risk; she developed massive bleeding after the administration of large doses of corticotropin and cortisone for the treatment of dermatomyositis. The patient was operated on three days after the onset of bleeding, because there appeared to be no hope of her recovering by any other treatment.

TABLE 5.—*Number of Patients with Duodenal Ulcer Treated Medically and Surgically and Number of Deaths Occurring, in Periods 1952-1953, 1954, and 1955*

Treatment Period	Patients Treated, Total No.	Medical		Surgical	
		Patients Treated, No.	Deaths, No.	Patients Treated, No.	Deaths, No.
1952—1953	55	44	6	11 (E*-6; I†-5)	2
1954	29	12	3	17 (E-5; I-12)	3
1955	28	12	1	16 (E-5; I-11)	3
	112	68	10	44	8

* Emergency surgery.
† Interval or elective surgery.

In the 1955 period, a single medical mortality occurred in the group of patients with duodenal ulcer. The death was from sudden massive hemorrhage that occurred in a patient who had been receiving large doses of corticotropin, prednisone, and cortisone over a period of five months for Raynaud's disease. Three patients died after surgery. One had had gastrointestinal bleeding for six weeks prior to his hospital admission, and, in spite of two weeks of medical management, his bleeding persisted. Subtotal gastric resection was performed, but bleeding recurred and the patient died five days postoperatively with hyperpyrexia. The second patient had bled severely after the administration of corticotropin for lymphosarcoma. The third patient in this group who died after surgery had been bleeding for one week and had been operated on in another hospital, without hemostasis being produced. She had received 40 units of whole blood prior to admission to the hospital and was in extremely poor condition. At the time of the repeat operation, the gastric mucosa showed diffuse massive bleeding from multiple erosions; this did not subside, in spite of subtotal gastric resection.

TABLE 6.—*Number of Patients with Gastric Ulcer Treated Medically and Surgically and Number of Deaths Occurring, in Periods 1952-1953, 1954, and 1955*

Treatment Period	Patients Treated, Total No.	Medical		Surgical	
		Patients Treated, No.	Deaths, No.	Patients Treated, No.	Deaths, No.
1952—1953	8	6	1	2 (E*-1; I†-1)	0
1954	8	4	3	4 (E-3; I-1)	1
1955	12	6	2	6 (E-1; I-5)	0
	28	16	6	12	1

* Emergency surgery.
† Interval or elective surgery.

Table 6 shows a high incidence of mortality in the group of patients with gastric ulcer treated medically; this suggests that, if such patients do not respond promptly to medical treatment, surgical intervention is desirable. Of the two medical deaths that occurred in this group in 1955, one patient had uremia and one died from the administration of corticotropin for the treatment of cirrhosis. The latter patient had a massive exsanguinating hemorrhage and died 24 hours after its onset.

Table 7 shows the incidence of marginal ulcer. Patients with this condition have, on the whole, responded well to treatment. The one patient who died in this group during 1955 had uremia.

Gastric Factor and Intragastric Drip Therapy

In the latter part of 1954 it appeared that we were encountering an increasing number of patients in the older age group who were not responding to medical

treatment and were not able to be operated on because they were poor risks or, occasionally, because they refused surgery. We reviewed our therapy, searching for a method of improvement. This led us to make a special study of the local factors that might affect hemostasis in ulcer. A series of in vivo and in vitro experiments were conducted in order to observe the effect of gastric juice on the coagulation of blood and on blood clots under variable conditions, with and without buffering. The details of the results of some of these studies have been published elsewhere[3]; others are to be reported.

Among the findings, we were impressed with the fact that blood will not coagulate in the presence of gastric juice containing free acid and pepsin unless it is buffered. It was also noted that the lysis of a blood clot appeared to vary according to the acidity of the gastric juice and the hematocrit reading of the clot. To prevent lysis by buffering, the agents used had to be increased in volume considerably above the usual clinical dose.

Because of these findings we attempted to produce more complete buffering of the patient's gastric juice as soon after his hospital admission as possible. After testing a variety of agents, we preferred a milk-protein polysaccharide mixture known as Sustagen, because it could be given in sufficiently large amounts to produce adequate buffering and was well tolerated by the majority of patients. It had the advantage of being a nutriment of high caloric value, with vitamin and mineral supplement, and yet it rarely produced abdominal cramps or diarrhea, as some protein hydrolysate products had in our experience. To obtain adequate buffering, we administered 120 to 250 cc. of a 1:2 dilution of this substance every one to two hours around the clock. The ability to maintain buffering throughout the 24 hours appealed to us as an excellent means of combating the deleterious effect of high acid and pepsin on hemostasis.

During 1954-1955, we used this form of therapy in the majority of patients with bleeding ulcer. A Levin tube is passed in all patients with suspected ulcer, and feedings are given throughout the night. These are stopped in the morning and the stomach emptied by aspiration prior to the x-ray study of the patient. After this, a small plastic nasogastric tube is passed and the feedings resumed. The results of the treatment appear good so far.

Comment

The enthusiasm for different types of treatment of the patient with gastrointestinal bleeding is usually based on the mortality rate encountered in them. The rate must depend in part upon the type of patient seen and upon the severity of the bleeding. It is notoriously difficult to settle on a uniform definition of "massive" bleeding or to know the number of such cases included in some reports. Furthermore, it seems likely that gastrointestinal bleeding would be a more serious problem in the often poorly nourished geriatric patient with complications as observed in the wards of an urban hospital than in the average patient seen by a private physician. As pointed out by Crohn,[4] statistics based on selected cases rather than on a consecutive group of patients could also give a radically different picture of the problem. From our experience in handling patients with gastrointestinal bleeding admitted consecutively to a large general hospital, we are impressed with the high mortality rate if all patients are included in a series irrespective of age, time of onset of bleeding, the presence of complications in other body systems, and when bleeding follows the administration of cortisone or corticotropin.

There are proponents of exclusive medical management; others feel that an excessive mortality can only be lowered by prompt surgical intervention. Meulengracht[5] has reported a mortality rate of only 2.5% in a large series of patients with bleeding ulcer treated by an early feeding regimen and supportive measures. Rasberry and Miller[6] analyzed 75 of their own patients and 2,111 collected cases treated medically with a gross mortality of 4%; they considered the results obtained by their early feeding regimen superior to surgical intervention. On the other hand, Finsterer[7] and Gordon-Taylor[8] have long advocated surgery to reduce a high mortality rate, and Stewart[9] recommends that all patients with massive bleeding from ulcer should have immediate surgery. To support this claim, he reports a mortality rate of 10.7% in a group of 65 patients with massively bleeding ulcer who were operated on, in comparison with a mortality rate of 21.4% in a comparable group of 42 patients treated medically in the same hospital.

TABLE 7.—*Number of Patients with Marginal Ulcer Treated Medically and Surgically and Number of Deaths Occurring, in Periods 1952-1953, 1954, and 1955*

Treatment Period	Medical			Surgical	
	Patients Treated, Total No.	Patients Treated, No.	Deaths, No.	Patients Treated, No.	Deaths, No.
1952—1953	3	1	0	2 [E*-1, I†-1]	0
1954	4	4	0	0	0
1955	4	3	1	1 [I†-1]	0
	11	8	1	3	0

* Emergency surgery.
† Interval or elective surgery.

From a large collected series of reports, Holman[10] found the mortality rate to average 9% in patients with moderately severe hemorrhaging peptic ulcer under conservative medical therapy. By a more critical analysis of a similar group, Crohn[4] found the mortality rate varied from 5 to 9%, averaging 6.9%; however, if only the cases of true massive hemorrhage are considered, the mortality rate may range as high as 29%. Following emergency surgery during the first 48 hours for massive hemorrhage, the mortality rates in the various reports range from 5 to 33%; when surgery has been delayed from three days to over three weeks for intractable bleeding, the mortality rates range from 5 to 54% and average 25%.[2] The variation in these statistics explains in part why there is a lack of unanimity of opinion as to the preferred method of treatment, but it has become obvious to most observers that the highest mortality occurs in those patients after the age of 45 years who continue to bleed and

in whom surgery is delayed. To overcome this obstacle, there has been an increasing trend recently toward a combined medical and surgical approach to all patients with gastrointestinal bleeding.

Summary

Since many patients with massive bleeding from peptic ulcer require both medical and surgical care, effective treatment is best accomplished by team management. One of the most important steps in handling patients who are emergency cases (and who so frequently present themselves for treatment at night) is to have an agreement among all services regarding a plan of management. In our hands this has best been accomplished by forming a bleeding team, with representatives from the medical, surgical, clinical laboratory, and radiologic services of the hospital. The team has functioned effectively by drawing up a suitable plan of management and acting in an advisory capacity in the evaluation of the condition of each patient admitted with gross gastrointestinal bleeding. Definitive treatment is delegated to the personnel of the ward on which the patient is located. We feel that our ability to manage these patients has improved greatly during the four years this bleeding team has functioned. All patients should have a trial initially on medical management, including in particular early feeding and adequate buffering of the gastric juice. Patients who continue to bleed or in whom bleeding recurs, in spite of medical therapy, should be considered candidates for prompt surgical intervention.

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References

1. Palmer, E. D.: Observation on Vigorous Diagnostic Approach to Severe Upper Gastrointestinal Hemorrhage, Ann. Int. Med. **36:**1484-1491 (June) 1952.

2. Boles, R. S., Jr.; Cassidy, W. J.; and Jordan, S. M.: Medical Versus Surgical Management for Complications of Hemorrhage in Duodenal Ulcer, Gastroenterology **32:**52 (Jan.) 1957.

3. Bodi, T.; Tocantins, L. M.; and Wirts, C. W.: Local Environmental Factors Affecting Hemostasis in Hemorrhage from Upper Gastrointestinal Tract, Clin. Res. Proc. **4:**18, 1956. Bodi, T.; Wirts, C. W.; and Tocantins, L. M.: Progress in Hematology, edited by L. M. Tocantins, New York, Grune & Stratton, Inc., 1956. Quintero, J. A.; Holburn, R. R.; and Tocantins, L. M.: Role of Blood Corpuscles in Rate of Lysis of Clots by Gastric Juice, J. Appl. Physiol. **6:**707-710 (May) 1954. Barkham, P., and Tocantins, L. M.: Action of Human Gastric Juice on Human Blood Clots, ibid. **6:**1-7 (July) 1953. Bodi, T.; Wirts, C. W.; and Carroll, R. T.: Effect of Human Gastric Juice on Blood Coagulation and Clot Lysis, Fed. Proc. **15:**21 (March, pt. 1) 1956.

4. Crohn, B. B.: Need for Aggressive Therapy in Massive Upper Gastrointestinal Hemorrhage, J. A. M. A. **151:**625-629 (Feb. 21) 1953.

5. Meulengracht, E.: Fifteen Years' Experience with Free Feeding of Patients with Bleeding Peptic Ulcer: Fatal Cases, Arch. Int. Med. **80:**697-708 (Dec.) 1947.

6. Rasberry, E. A., Jr., and Miller, T. G.: Prompt Feeding Program for Bleeding Gastric and Duodenal Ulcer: Report on 2,111 Collected Cases, Including 75 Personally Observed, Gastroenterology **1:**911-921 (Oct.) 1943.

7. Finsterer, H.: Operative Treatment of Severe Gastric Hæmorrhage of Ulcer Origin: Reply to Critics, Lancet **2:**303-305 (Aug. 8) 1936.

8. Gordon-Taylor, G.: Problem of Bleeding Peptic Ulcer, Brit. J. Surg. **25:**403-425 (Oct.) 1937.

9. Stewart, J. D.; Sanderson, G. M.; and Wiles, C. E., Jr.: Blood Replacement and Gastric Resection for Massively Bleeding Peptic Ulcer, Ann. Surg. **136:**742-751 (Oct.) 1952.

10. Holman, C. W.: Further Observations on Treatment of Bleeding Peptic Ulcer, Surgery **23:**405-410 (March) 1948.

Mobilization of the Stapes.—Not since Lempert's original publication in 1938 of his one stage fenestration operation has a procedure caused so much interest, excitement and controversy among otologists as the stapes mobilization operation for deafness secondary to otosclerosis. This operation is based on a direct approach to the site of pathology where otosclerosis has produced a fixation, and consists of restoring movement to a previously immobile stapes. The degree of stapedial fixation is reflected in the hearing acuity since normal hearing depends on a freely moveable ossicular chair ending in the oval window. When movement is impaired in the stapes, a mechanical obstruction in the ossicular chain is produced and deafness develops. The deafness being directly proportional to the loss of stapes mobility. As impairment progresses to complete stapedial fixation, a maximum conductive loss of 50 to 60 decibels may develop. During this time the bone condition level may remain perfectly normal and indicates the cochlear potential or the level at which the hearing may be restored if the ossicular chain again becomes completely mobile. . . . For determining suitability of cases for the fenestration operation, Rosen in 1952 began testing the stapes for fixation prior to the operation employing a technique suggested by Lempert for tympanosympathectomy. During the course of this testing procedure, movement in the stapes was re-established in some of these patients and they heard immediately; a dramatic improvement of hearing on the operating table. This experience prompted the use of stapes mobilization primarily to improve impaired hearing in otosclerosis, and in 1953, Rosen reported his first cases by this transtympanic approach.—H. G. Tabb, M.D., Mobilization of the Stapes for Restoration of Hearing in Otosclerotic Deafness, *Journal of the Arkansas Medical Society*, September, 1956.

TENDON TRANSPLANTATION IN REHABILITATION

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• *Tendon transplantation is a versatile and gratifying procedure if it is well planned, if the technique is meticulously followed, and if adequate thought is given to the postoperative care and training of the patient. The ideal situation is one in which the transplantation removes a deforming influence in one area and provides desired control in another. The tendon must be securely anchored in its new insertion, tension must be sufficient to hold the affected part in a desirable position, the muscle must exert its action in a straight line from origin to new insertion, it must not be required to work against a contracture, and it needs continued support in a somewhat overcorrected position. The postoperative care includes a program of assisted exercise, and careful nurturing of the transplant into its new function. Tendon transplants are most useful in flaccid paralyses like those after poliomyelitis, nerve injuries, and obstetric trauma.*

Tendon transplantation has attracted the interest and research activity of many of our predecessors since its original description by Nicoladoni in 1882 and the early work of Drobnick, Lange, Vulpius, and Codovilla. There are many who have contributed to the techniques and who have proposed various types of transplantations: Ober, Mayer, and Biesalski, Steindler, and Bunnell are some who may be mentioned among those who have been foremost in these developments. There has always been a great difference in feeling among orthopedic surgeons about tendon transplantation. Even at this time the enthusiasm for the operation is spotty. Some doubt likely results from any tendon transplantation; some believe that favorable results may come from certain types of transplantations, as for example that of the hand, but that it should not be performed in the lower extremities; and others have an enthusiasm for the operation in any area provided certain indications for its use exist. There must be some reason for the great divergence of opinion. It is about this and the factors that influence the result from such surgery that I wish to speak.

Indications for Transplantation

Tendon transplantation represents the only possibility of replacement of active muscular action to carry out a particular motion when it would otherwise be permanently lost by paralysis or some other cause. The usual indication for transplantation is paralysis of a muscle or muscles that have a major functional responsibility in a region where strong muscles are available for transfer. The indication may also be that of a deforming imbalance that interferes with stability and produces deformity.

In considering the possible indication and value of a transplantation, there is much more to be taken into consideration than the absence of a particular muscular action or the presence of deforming muscle function. The transplantation must be considered in relation to the total function of the part and, indeed, the total function of the individual. Whether a particular transplantation is indicated at the knee, for example, may well depend upon the muscular status about the hip. It seems superfluous to comment that a complete and accurate muscle examination of all areas must be made and studied and that all factors of deformity and abnormal function must be carefully evaluated as to their origin and the mechanisms influencing them. The cause of the muscle weakness, its possible progression or improvement, the age of the patient, and the likelihood of increasing deformity as growth occurs are some of the things to be considered.

Evaluation of Muscles for Transplant.--Most of the difficult analytic considerations arise in relation to evaluating the muscles for possible transplantation. In the first place, it must be possible to transplant the muscle so that its pull can be effectively transmitted for the new action. Furthermore, the muscle or muscles must be strong enough to carry out the new function. Muscles that do not have a muscle rating of good or better rarely warrant transplantation, since a certain percentage of power is lost in the transfer. The size and strength of the muscles must be considered in relation to the task that they are called upon to do. In the foot, for example, a transplantation, in case of foot drop, of the peroneus longus forward might be expected to produce effective dorsiflexion; yet the same tendon transferred alone to the back of the os calcis for calcaneus would have only very moderate effectiveness. The need for strength in a posterior transplant is so great that three or four muscles might well be transplanted to substitute for the gastrocnemius-soleus action if the best function is to be obtained.

Although it is not necessary that the transplanted muscles have the full strength of the muscles for which they substitute, they must have enough strength to improve function. In general, the need for strength is outstanding in transplants of the lower extremities; for this reason, it is often desirable in this region to use more than one muscle in combination in order to produce effective action. In the upper extremities, on the other hand, strength is not the controlling feature. The need is likely to be that of a transplantation of single muscles for a particular controlled action. When possible, the substituting muscles should have ranges of contraction similar to those of the muscles for which they are being transplanted. This is of most importance in the upper extremities, particularly in regard to finger motion.

Chairman's address, read before the Section on Orthopedic Surgery at the 105th Annual Meeting of the American Medical Association, Chicago, June 13, 1956.

Advice is frequently given that transplantation of antagonistic muscles is undesirable. It is true that the transplantation of muscles of like function or corollary activity represents the simplest problem of adaptation. However, antagonistic muscles may be transplanted without qualm. Such transplants as the semitendinosus and biceps femoris to the patella and the anterior tibial to the back of the os calcis for calcaneus are examples of transplants that are very effective, provided the training of the transplant is carefully carried out and its functions are developed by close supervision.

The essential consideration in transplantation is that of being sure that the muscles to be transplanted are more important in total function as a transplant than in their original position. The loss that may occur from the shift of action of the muscle to be transferred must be weighed just as carefully as the gain in action anticipated. In general, transplantation is only feasible when the original function of the transplantable muscle is relatively expendable. Occasionally, however, a muscle can be transferred so as to carry out its essential original function as well as a new one. The simplest example of this is the transfer, in a case in which the deformity is one of inversion, of the anterior tibial to the middle of the foot. The function of dorsiflexion is maintained, but the inversion deformity is corrected.

Remaining Musculature.—One must consider the effect of the transfer not only upon motion but also upon stability in relation to deformity. In choosing the muscles for transplantation, one must preserve a balance in the remaining musculature. This is most important in parts that have to do with weight bearing. In the foot, one seeks to have balance in strength of the muscles having to do with inversion and eversion and one must try to develop a balance between the anterior and posterior groups in transplantation. The relative strength of the muscles antagonistic to a transplant must be considered. For example, a posterior transplant is very much inhibited by strong deforming anterior forces.

Many of the deforming forces arising from muscle imbalance in the growing individual express themselves only after some period. One may be tempted, for example, to transplant posteriorly for calcaneus the peroneus longus in combination with other muscles, perhaps the peroneus brevis, the posterior tibial, and the common toe flexors. However, if the peroneus longus is used in the presence of a strong anterior tibial, one may, in the child, anticipate the gradual evolution of a dorsal bunion. The unopposed anterior tibial gradually produces the up-riding of the first metatarsal. It is, therefore, good policy, if the anterior tibial is strong, to maintain the peroneus longus at its original insertion or, in some way, to substitute for its action if it is to be used. When the peroneus longus is transferred, it is often desirable to attach the peroneus brevis to the distal end of the divided tendon of the longus in order to maintain its action on the first metatarsal. The other course, in a case where the peroneus longus is to be shifted, is to transfer the anterior tibial from its insertion in the first metatarsal.

One may perform an arthrodesis in certain areas to provide stability and thus make available for transfer muscles that would otherwise be required to maintain stability and balance. Particularly is this true in the foot, and yet, by carefully considering balance when one chooses muscles for transplantation, I have found that arthrodesis of the foot is often not necessary, particularly if the balance is well established before severe deformity develops.

The ideal situation in a transplantation is one in which a muscle that is deforming is used and is transplanted so as to substitute for an essential weakness. Such a transplantation has a double value: it removes the deforming influence and provides the control that is sought. An example of such a transplantation is one of the flexor carpi ulnaris to the extensor carpi radialis longus in cerebral palsy for correction of flexion-pronation deformity of the wrist with ulnar deviation. By transferring this tendon around the ulnar side of the forearm and attaching it into the extensor carpi radialis tendon, one promotes supination as well as dorsiflexion. Furthermore, by removing the flexor carpi ulnaris from its original insertion, one eradicates the chief deforming factor that was producing the ulnar deviation and flexion deformity.

Age at Transplantation.—A transplantation should not be performed in a child until he has reached an age that will allow for the training of the transplant. Ordinarily this would not be younger than 5 years in a child with normal discipline. An older age is to be preferred, unless there is some reason that makes transfer at the younger age desirable. One must weigh carefully the deforming factors that are arising from continued muscle imbalance and decide whether delay of the transplantation will lead to increasing deformity that will complicate the results. The time of the procedure depends in part upon the ability to control the deforming factors by conservative measures. In certain areas, early surgery is often desirable. For example, if a child has a paralysis from poliomyelitis of the gastrocnemius-soleus muscles and is developing a rapidly progressing calcaneus with distortion of the foot, much can be gained by doing a posterior transplantation before such deformity becomes severe. By properly choosing the muscles to be transplanted, provided they are in good supply, one may maintain the lateral balance of the foot and, at the same time, correct the calcaneus deformity, often restoring function to a remarkable degree. Forces properly transferred stimulate more normal development. Tendon transplantation should not be done until the child has reached the age of full cooperation; yet, at the same time, one must not delay such transplantations unduly, if their delay results in progressive deformity and distortion.

Techniques

The technique of tendon transplantation, as practiced by different surgeons, shows great variety; yet certain basic principles should pervade the procedures.

The first consideration is that a transplant must not be required to work against a contractural deformity. One should not, for example, do an anterior transplantation with the foot in talipes equinus. If one expects such a transplant to function satisfactorily, it is necessary, in one way or another, to bring the foot to a right angle before the transplantation is performed. Not only does the deformity need to be corrected prior to transplantation but also it must be kept supple and stretched out after the operation until the muscle has assumed full function and until the deformity shows no tendency to recur.

A straight line of contraction must be developed from the origin of the muscle to its new insertion. The most common error in this regard is to free the muscle insufficiently toward its origin. Too short an incision is made over the belly of the muscle at a too distal position. As a result, when the tendon is pulled up into the proximal incision for redirection, it is passed in an angular fashion to its new insertion; and the pull of the muscle is distorted and ineffective. The belly of the muscle must be freed carefully in its distal position to the extent that is necessary to provide for a straight passage from its origin to its new insertion, and the distal portion of the muscle is shifted to a new bed as required to permit this. If any change in direction must be developed, the dissection must be proximal enough so as to free the muscle to a level where its direction may be shifted rather than to expect the tendon to function over an angular course.

Passage of the tendon through good gliding structures with adequate space is most important. The passage of tendons beneath the deep fascia in gliding compartments or tendon sheaths is much preferred. When a muscle must be passed through intramuscular septums or deep fascia, a large channel must be developed through such septums, with such excision of them as seems appropriate so that the muscle and tendon will not be bound down and will have adequate room. Furthermore, the structure in relation to bone or such septums should be muscle rather than tendon. Subcutaneous passage of tendons is preferred by some, but I use it only in a very limited way. For example, in the thumb, in transplanting one of the sublimis tendons to provide for opponens action, the subcutaneous technique is used.

In the freeing of the tendon and the muscle, gentle handling must always be the rule. One must be careful of the innervation of the muscle and, to a lesser extent, of the blood supply; but one must not be so timid as to free the muscle inadequately. Ordinarily the vascular supply is such that it is well maintained unless very radical dissections are made. The paratenon and visceral sheath are preserved over the surface of the tendon as the muscle and tendon are freed, since they aid the tendon in its gliding functions in its new position.

When pulling the tendon from the distal wound up to the proximal wound for reinsertion, one must make sure that traction is not made upon the origin of the muscle, since this may denervate it. Ordinarily, one should hold the proximal segment of the muscle tendon preparation with a moist sponge, steadying it while one makes traction on the distal tendon to pull it up into the proximal wound, using a separate moist sponge for grasp with the fingers.

Once the muscle direction is well established by dissection and the passage space for the tendon is adequate and it has been planned that any possible adherent areas are to be occupied by muscle rather than tendon, one is prepared to use a tendon passer to pass along the gliding tissues to the new insertion. The tendon passer should be of adequate size to spread the tissues enough so that binding does not occur. The tendon should be passed gently without torsion.

Bony insertion of the tendon is preferable, where possible, to insertion into a tendon or other tissues. This is particularly so in the lower extremities, where weight-bearing factors are involved. In the upper extremities, it is often necessary and desirable to attach tendon to tendon. Whatever method is used in the attachment, the distal end of the tendon and that portion that will be in relation to the tissue to which it is to grow should be very carefully scarified; the sheath and paratenon should be removed, the tendon should be scraped, and even small crosshatches with a knife are highly desirable. A very excellent way to insert the tendon into bone is by way of a window or a fish mouth cut through the cortex so that the tendon may be buried deep in the bone and held in place with silk sutures coming through drill holes from the depth of the window to the cortex.

In other cases the tendon is placed by way of a drill hole through bone, passed through such a hole, and resutured to itself. On other occasions, such as in a posterior transplant through the os calcis, a drill hole is made through the bone, through the apophysis, and coming out on the bottom of the foot in front of the tuberosity of the os calcis, and the tendon is directed straight through the hole and attached with silk sutures to the periosteum and conjoined tendon on the short flexors of the bottom of the foot. Such a technique allows the transplanted tendons to be placed under the desired tension without compromise.

The suture used for anchoring the tendon may be either silk or wire. Usually braided silk from a grade of 000 to 0 and rarely even as strong as 1 is required. Sizes 00 and 0, depending upon the strength required, are most frequently chosen. On occasion, stainless steel wire is used, either by the pull-out technique of Bunnell or by the method in which the wires remain in place.

In the upper extremities, where tendon-to-tendon sutures are to be the method of anchorage, the process used will depend upon the tendon. For example, in

transplanting the flexor carpi ulnaris to the extensor carpi radialis longus, ordinarily a buttonhole is made in the tendon that is to be the anchorage, namely, the extensor carpi radialis, and the end of the transplanted tendon is buried in the buttonhole after the manner of Ober. In certain instances, end-to-end silk sutures are used; and in other instances, pull-out techniques of wire sutures are employed.

The tendon must be inserted under sufficient tension to hold the part in the position that it is expected that the transplanted tendon should produce during its maximal range of contraction. For example, a transplant to the wrist to accomplish dorsiflexion should, after insertion and while the patient is still under anesthesia, hold the part in dorsiflexion. Transplants should be tested to make sure that they will hold in such fashion. The time to test the strength of the insertion is at the time of surgery and while you are observing it. As a further example, a transplant to substitute for the gastrocnemius-soleus action should hold the foot in a talipes equinus of about 30 degrees when tested by relatively firm pressure. This degree of plantar flexion would be used if the dorsiflexors of the foot are of good power. When there is some weakness in dorsiflexion, one would probably have the transplants under good tension at about 15 degrees of talipes equinus. It is well to point out that there are other factors in the care of transplants that depend upon the relative strength of musculature. For example, if there is weakness of the dorsiflexors of the foot, one would start motions in dorsiflexion sooner after a posterior transplantation than if such weakness did not exist.

Support for the transplant in a position that allows the tendon to be in a relaxed attitude is the rule. For example, if one did a transplantation of the peroneus longus forward to provide dorsiflexion of the foot, one would put the transplant in under a tension that would hold the foot at about a right angle. Yet when the cast was applied, one would place the foot a few degrees beyond this so that the tension of the tendon in the immobilized position would be reduced. Ordinarily, the cast is bivalved at the time of surgery or shortly afterward so that the foot will be ready for inspection and for exercises at an early period.

Postoperative Care and Training

It is my conviction that more poor results arise from inadequate, poorly conceived, impatient postoperative care and training than from any other cause. It is this area of discussion, therefore, that I would like to emphasize. There may be variations in the details of such postoperative care; indeed, it varies depending upon the type of transplantation involved. However, certain fundamental principles must be followed if best results are to be obtained.

Continued Support in Overcorrected Position.—Continued support in an overcorrected position is the first important rule. Granted that the transplanted tendon is placed under tension in the beginning, the supported position of the part should be one of overcorrection of the position that is desired and one that provides relaxation of the transplanted tendon. In most cases of transplantation, active exercises of the transferred muscle may be started somewhere around the fifth to seventh postoperative day. There are times when such training is much delayed, as when the transplantation was combined with an arthrodesis. In general, it is at about the fifth day that the postoperative reactions are subsiding and that exercises may be started painlessly, provided they are done very gently and only as an exploratory maneuver at the start.

The principle involved is that the patient attempt to produce the motion that was the former action of the transplanted muscle, while at the same time he is manually assisted to carry out motion of the part in the direction that is provided by the transplant. The actual motion in the beginning is over a very small range and is guided and protected. Even in the instance of a transplanted antagonist, there is usually one motion of the muscle that can be made that is not antagonistic. For example, if an anterior tibial is transplanted posteriorly, the motion called upon is not dorsiflexion but inversion, in combination with guided plantar flexion. In the instance of hamstring transplants to the patella for extension, one can combine the guided extension of the knee with an active attempt at extension of the hip with use of the hamstrings. In the instance of a transplant of the flexor carpi ulnaris to the extensor carpi radialis longus, the active motion is that of an ulnar deviation, in combination with a guided extension of the wrist. There is much to be said for the surgeon himself performing the first exercises with the patient, so that he may evaluate factors that will aid the physical therapist in training of the particular transplant.

Only a few motions are made at each exercise period in the beginning; ordinarily they are started in the bivalved cast, which prevents the part from dropping down and pulling on the transplanted tendon; but very soon the part is gently removed from the plaster cast and the exercises are carried out through a greater range, with the transplanted muscle being protected from being stretched out of its resting position.

Assisted Exercise for New Use of Transplant.—As soon as the patient gets the feel of the transplanted tendon and its action, it is no longer necessary for him to attempt to carry out the original action of the muscle before it was transplanted. The exercise then becomes a straight guided assistive maneuver, in which one must make sure the transplant works. This may be determined by palpation. Occasionally the patient has difficulty in "finding" the transplant. Gentle passive motion with mild tension on the transplanted tendon may give the feeling desired; then the

patient may be able to use it actively. Shifting of positions in attempted motion or the use of corollary motions may assist in finding the transplant. Rarely do we employ electrical stimulation in the training program, although, if after three weeks, difficulty still exists in "finding" the transplant, such stimulation may be used to initiate contraction as the patient himself attempts to use the muscle. This gives the patient the feel of the transplant, and ordinarily the transition into active contraction is expected after a few sessions.

In the beginning, the part is retained in the bivalved plaster support except for the exercise period. Exercises are usually carried out two times a day at the start and may very soon be increased to three or four sessions a day. In the beginning, the number of motions at each training period may be only 4 or 5, but soon the number is increased to 10, and later more. At first the physical therapist carries out the exercise regimen until the new function is performed properly, and then she teaches a member of the family to carry out the exercises with the patient. Once the function is well established, the range is gradually increased, although resistance exercises are not permitted sooner than six weeks after the procedure and then only of moderate degree. Heavy resistance exercises, even if indicated on the basis of strength, are not carried out until at least three months after the transplantation.

How soon more activity can be permitted depends upon the particular transplant and other factors. One can permit increasing freedom more quickly in the instance of a hand transplant than in one that is concerned with weight bearing. Furthermore, one can give more leeway to a dependable adult than to a young child who is a firm believer in the all-or-none law. A transplant should not be made to work, other than at an exercise period, until it can carry out its motion effectively over a good range. Once it can do this with increasing strength, controlled activities are gradually increased. The big thing is to develop a good functional range rather than to develop power at the start.

Incorporation of New Functional Pattern.—The next step after developing the simple motion provided by the transplant is to incorporate the transplant into the functional pattern formerly occupied by the muscle for which the transplant substitutes. In the instance of transplants about the hand, the early exercises of motion are tied in directly with the functional activities of the hands, and the shift to functional synergistic activity is an imperceptible one. On the other hand, in the instance of muscles concerned with gait and locomotion, considerable secondary training is necessary. For example, a peroneus longus muscle may be transplanted to produce dorsiflexion of the foot, and it is trained to dorsiflex the foot beautifully with good strength; yet if the patient is then called upon to walk, he walks with his original drop-foot gait. There is little association between the activity of dorsiflexion and the control of foot drop and the function of the foot in walking. It is necessary, therefore, to teach the patient to use the transplant in his gait as an active practice until it becomes a part of his walk. The failure to do this is one of the common reasons for failures of tendon transplantation in the lower extremity.

In a posterior transplant, the transition to the function of walking is particularly important. In the first place, it is especially easy to stretch out the transplant on walking; and if it is not used in gait, it is stretched by the retrograde action at the foot that occurs with each step. In the supervised transition to standing and walking, the patient, who is using crutches, is placed on his feet, with a 1-to-1.5-in. lift under his heels so as to not stretch out his transplant. This activity is begun 8 to 10 weeks after the operation. As this is done, it is best to observe the line of the transplant in the heel, and, for this reason, this activity is ordinarily started with the patient barefoot. The next phase, about a week or so after the individual has become accustomed to standing, is instruction in "push-off" with the use of the transplant. This is a partial, controlled effort, with the patient using the protection and assistance of crutches. The physical therapist supervises the action and makes sure that the patient uses the transplant as the action is attempted. Once this is mastered, the patient then puts on his shoes and is shown how to "push-off" in gait with the use of crutches. Early in training the exercise is just an attempt at "take-off" and a return to the former position without taking the full step. Then the full step is added, and gait, with the patient using his crutches to assist in push-off, becomes an exercise. In the early transition to walking, the patient still wears the bivalved cast most of the time, except at the exercise periods. As his gait becomes effective, his foot is given more and more freedom from the cast. Night use of the cast goes on for a long time.

Importance of Crutches.—In the development of function in the lower extremity after transplantation, crutches are particularly valuable. With them the individual can be taught to use the transplant, can get the feel of its use, and yet can protect the part from undue strain. To put braces on a patient early after a transplantation with little regard for functional training of the transplant is highly undesirable. Braces may be used for specific purposes. A spring brace, along with crutches, may be used, for example, to aid in developing the function of a posterior transplant provided the patient does walking exercises without the brace as well and provided the main effort is toward training the transplant and stimulating its function. The use of braces to protect the part may provide for earlier activity generally, but it does not substitute for the training of the transplant without braces.

In various transplants, the prolonged use of a bivalved night cast is very important. For example, in the anterior transplant of the foot, in which there is often a tendency for a contracture in a talipes equinus

position, the use of a cast for prolonged periods is often indicated. This is true, although to a lesser extent in the upper extremity as well. In an opponens transplant of the thumb, the hand should be splinted in the position of apposition from the beginning, except when it is removed for exercises; even after it is functioning well, the use of a night splint with the thumb in apposition is highly desirable for a considerable period.

Importance of Combating Contractures.—During all the period of concentration on active exercises for a transplant, the importance of combating contractures that oppose the transplant should never be lost. Regular stretching exercises for such contractures must be a part of the exercise regimen from the start. Patients with transplants need occasional supervision for a long time. Particularly is this so in children. In all transplants, one must continue to make sure that deformities that oppose the action of the transplant do not develop. Stretching and night support over a long period of time may be necessary. Balanced function of the transplant must be developed before one can discard such equipment. Frequently some "setting-up" exercises for a transplant should become a part of the daily living of the patient. A little stretching once a day to combat deforming tendencies and active motion over a full range, with or without resistance, may be in order as a continued practice.

Summary

Tendon transplantation is a versatile, effective procedure. Its effectiveness must be judged on the basis of the functional improvement that it produces. Its greatest use is in flaccid paralytic conditions such as poliomyelitis, nerve injury, and obstetric paralysis. In addition, selected transplants have great value in cerebral palsy and in nonparalytic lesions as well. If a tendon transplantation is well planned, if the technique is meticulously followed, if the training of the transplant is effectively performed, and if the patient observes certain simple rules in daily living after such a transplant, I know of no procedure quite as satisfying to the orthopedic surgeon in its result.

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CHORDOMA–UNCOMMON DESTRUCTIVE LESION OF CEREBROSPINAL AXIS

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• *The difficulties of making a diagnosis of chordoma are illustrated by the roentgenographic findings in 20 cases. In 10 cases the lesions arose from the base of the skull, 6 lesions were vertebral and 4 sacrococcygeal. The clinical findings and differential diagnosis will vary with the level of the lesion. Chordomas are slow-growing and destructive. A striking extraosseous component often is present, and this soft-tissue mass may predominate over the bony changes as demonstrated in roentgenograms. Because chordomas are usually lacking in distinctive features, preoperative diagnosis is uncommon.*

In the diagnosis of an entity such as chordoma, which is both uncommon and without pathognomonic features, it is axiomatic that a high index of suspicion is essential. This report is presented in order to emphasize the fact that chordomas do exist, that the radiographic evidence of their existence is quite variable, and that chordoma must be considered in the differential diagnosis of destructive lesions occurring anywhere along the cerebrospinal axis.

These neoplasms exhibit a definite predilection for the extremes of the spinal axis, the great majority arising either in the basioccipital or sacrococcygeal regions. The vertebral lesion is particularly uncommon and accounts for only approximately 15% of all reported chordomas.[1] However, recent experience at the Cleveland Clinic has been somewhat to the contrary, and our interest in this subject has been stimulated. In the five-year period since 1951, of eight chordomas diagnosed, six were vertebral. A total of 12 chordomas were seen prior to this in the period 1922 to 1950, and none of these were vertebral. Although the findings in this relatively small series may not be statistically significant, the over-all incidence of vertebral lesions being 30%, they point out the need to consider more seriously the vertebral site for chordoma.

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Clinical Features

Chordomas are of low-grade malignancy, and they arise from neoplastic proliferation of remnants of the notochord. These vestiges can be present anywhere along the cerebrospinal axis, the primitive notochord extending from the buccopharyngeal membrane to the coccyx. There is slow expansile growth, with destruction of bone and extension to adjacent structures. An extraosseous, soft-tissue component, variable as to degree, is an almost constant finding. Complete surgical removal is nearly always impossible because of extension of the neoplasm to vital structures in areas that preclude radical dissection. Recurrence is the rule, and multiple operations often are required to reduce the mass of the tumor as it re-forms. Radiation is of only palliative value, producing transient regression of the tumor and relief of pain. Chordomas are almost

uniformly radioresistant, and sterilization is all but impossible.[2] Death from chordoma usually is the result of local extension after a prolonged postoperative course.

The level of the lesion determines the neurological deficit and, thus, the clinical signs and symptoms. Onset is insidious, with symptoms of long duration, often measured in years rather than in months. In patients with cranial lesions, the findings usually are those of brain tumor with increasing intracranial pressure. Backache is the most common complaint of patients with chordomas in the vertebral and caudal locations with variable spinal cord and nerve-root involvement. As stated above, a correct preoperative diagnosis is uncommon, as there are no pathognomonic features either clinically or by roentgenographic examinations.

Vertebral Chordoma

In an analysis of the regional findings, the vertebral group is considered worthy of emphasis, vertebral chordoma offering the greatest diagnostic challenge. There were three lumbar chordomas in the group under consideration, each of which was confined to the third vertebra. C-2 and C-4 were the sites of the two cervical lesions. One chordoma was seen at T-11, the thoracic spine being by far the rarest site of this uncommon neoplasm. Thus, of the six lesions, five were located in either the upper cervical or lower lumbar regions. This is consistent with the general polarity of chordomas, which show predilection for the extremes of the axis even when vertebral.

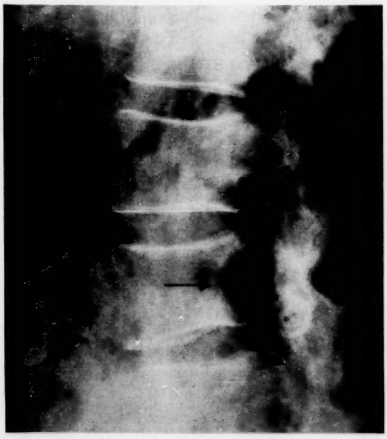

Fig. 1.—Chordoma of third lumbar vertebra with sharply demarcated local posterior erosion adjacent to spinal canal. Findings simulate those with primary intraspinal tumor.

Lumbar Chordomas.—All three of the lumbar chordomas were remarkably similar. Two of these lesions showed local erosion, confined to the posterior portion of the body adjacent to the spinal cord, and some involvement of the pedicles. There was no collapse, and the intervertebral spaces were normal. Figure 1 shows the roentgenographic findings in one of these patients, a man aged 60 years who complained of back pain and increasing difficulty in walking of 17 months' duration. The margin demarcating the destruction is sharply defined; this is common to slowly growing lesions. No reactive marginal sclerosis is present, as this is not a feature of chordomas. The appearance of these lesions is indistinguishable from that of a primary intraspinal tumor such as neurofibroma or meningioma with anterior extension. Our third patient with a lumbar chordoma had symptoms of cord compression. Roentgenograms of the lumbar spine demonstrated only equivocal bony change posteriorly, with the pedicles intact. Myelographic study (fig. 2) revealed an elongated extradural defect producing almost complete block. In each of the three instances the clinical diagnosis quite reasonably was that of spinal tumor. Of particular significance is the predominance of the extraosseous component in the lesion in the third patient, soft-tissue extension being responsible for the main findings, while bony destruction was barely recognizable.

Fig. 2.—Chordoma of third lumbar vertebra. Myelogram demonstrates large extraosseous component producing almost complete block, with bony destruction barely recognizable.

Cervical Chordomas.—The two cervical lesions were somewhat more extensive. Figure 3 shows lytic destruction and partial collapse of the second cervical vertebra in a woman aged 56 years who had neck pain of 18 months' duration. Slight indentation of the nasopharyngeal air column was present because of an associated soft-tissue component. Soft-tissue growth into the nasopharynx has been reported both from cervical and, more commonly, from cranial chordomas. In certain cases, obstruction of the nasal passage may

be the initial symptom. This case also was a diagnostic problem, as infection and neoplasm were considered equal posssibilities. This is a rather common location for tuberculosis, which frequently is accompanied by a paravertebral abscess mass.

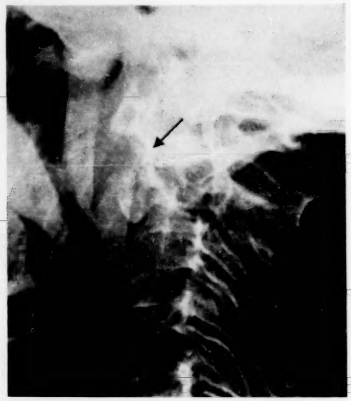

Fig. 3.—Chordoma of second cervical vertebra producing osteolytic destruction and partial collapse. There is soft-tissue extension anteriorly indenting the nasopharyngeal air column.

Laminagrams were made in an attempt to evaluate the findings more accurately. This procedure can be a valuable adjunct in diagnosis and probably is not employed as often as it should be. The laminagrams showed minimal destruction of the superior plate of C-3, although the intervening interspace did not appear narrowed. There are conflicting statements in the literature as to the fate of the intervertebral space in chordoma. Tumor can extend across the interspace to involve contiguous bodies. The disk, however, is relatively resistant, and, while narrowing of the interspace may occur with time, total destruction such as is seen in infection is uncommon.

The lesion at C-4 also showed diffuse lytic destruction, but without any collapse. Oblique views showed circumscribed destruction in the area of the left pedicle, with extension to involve the adjacent lamina of the third vertebra.

Thoracic Chordoma.—The chordoma in the thoracic spine was particularly instructive. The patient, a man aged 48 years, gave a history of progressive back pain dating back one year. Initial x-ray studies showed lytic destruction confined to the anterior portion of T-11. The clinical diagnosis was tuberculosis, but the patient failed to improve after administration of streptomycin. When the patient was first seen at the Cleveland Clinic, the lesion had progressed to involve the entire 11th thoracic body, which was partially collapsed, and there was marginal erosion anteriorly of the adjacent 10th and 12th bodies (fig. 4*A*). No significant narrowing of the interspaces was present. On anteroposterior view (fig. 4*B*), a large bulging left paravertebral mass could be outlined that was strikingly similar to the abscess mass of tuberculosis.

The patient's downhill course continued, and diagnosis was uncertain. It was only at autopsy that the true nature of his lesion, a chordoma, was established. A further unusual feature was the presence of metastases in the lung and lymph nodes. Metastases from chordoma are quite uncommon and, when present, are seen almost exclusively with sacrococcygeal chordomas.[3] Only a few isolated instances of metastases from chordomas in other locations have been previously recorded. In this series of 20 cases, the only other metastases occurred from a sacral chordoma. This case is then the height of rarity: a thoracic chordoma with metastases.

Comment.—As shown, involvement can vary from local destruction of a single body to multiple contiguous body involvement. The extensive lesion was the exception in this series. Extent, of course, will depend in part on how soon the lesion is diagnosed, with posterior growth into the spinal canal giving earlier severe symptoms. In the series of Wood and Himadi,[4] all five patients with vertebral lesions showed involvement of two or more vertebral bodies and also disk invasion. Two of their patients showed striking osteoblastic change. Utne and Pugh [1] suggest that this may simply represent reactive bone change associated with compression, or severe osteoarthritis, rather than new bone formation. All of the lesions in our series were osteolytic.

In no instance did the chordoma arise from the intervertebral disk. This is of interest in that the nucleus pulposus of the intervertebral disk normally is composed of residual notochordal tissue. Apparently, then, only those vestiges that remain abnormally incorporated in the vertebrae become the source of neoplastic growth.

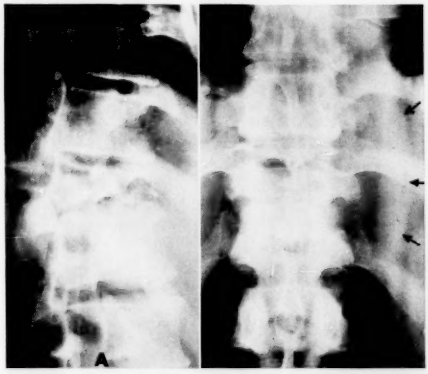

Fig. 4.—*A*, thoracic chordoma involving multiple contiguous bodies with preservation of intervening interspaces. *B*, anteroposterior view shows large, bulging soft-tissue mass to left of spine, simulating the paravertebral abscess of tuberculosis.

The differential diagnosis encompasses all causes of vertebral destruction. There are the several groups of neoplasms of the spinal column: primary bone tumors, intraspinal tumors, and metastatic growths. Included in the primary group are both benign lesions (giant

cell tumor, aneurysmal bone cyst, hemangioma) and the reticuloses, as well as osteogenic sarcoma, chondrosarcoma, plasma cell myeloma, and lymphoma. Infection such as tuberculosis, particularly when accompanied by a paravertebral abscess mass, can be quite confusing.

It is apparent, then, that there is no typical x-ray picture of a vertebral chordoma. The location of the lesion, its extent and direction, the soft-tissue component, and the condition of the interspace are all variables. Although destruction usually is osteolytic, not even the presence of osteoblastic change will allow exclusion of chordoma. In not one of the six cases presented could a preoperative diagnosis of chordoma be made. This recent preponderance of vertebral chordomas raises the possibility that they are less rare than supposed. It is possible that, with increased emphasis on tissue diagnosis, more vertebral chordomas will be identified. Clinically, they almost certainly will be misdiagnosed as one of the more common destructive lesions, enumerated above, that chordomas can simulate.

Cranial and Sacrococcygeal Chordomas

The more commonly seen cranial and caudal chordomas tend to present a somewhat less variable roentgenographic appearance. A most important feature is the midline origin of the lesion, which usually is apparent, although growth may be quite eccentric. Diagnosis also is aided by the higher index of suspicion we have for chordoma in viewing destructive lesions in these regions.

Sacrococcygeal Chordomas.—The sacrococcygeal region is the most common site of origin, accounting for some 45 to 50% of all lesions. A disproportionately small number of the 20 chordomas in our series were caudal, there being only 4 such lesions. As mentioned, 6 lesions were vertebral and the remaining 10 were cranial. It has been stated that in nearly half of all sacrococcygeal lesions a correct preoperative diagnosis is possible, based on the rather typical roentgen findings of a lobulated, midline osteolytic defect, with well-defined margins, and a prolonged clinical course.[4] However, while quite suggestive of chordoma, these findings are by no means pathognomonic. Most of the neoplasms of bone previously enumerated in the differential diagnosis of vertebral chordomas are capable of producing midline sacral destruction. Of these, chondrosarcoma and giant cell tumor deserve particular consideration. Intraspinal growths, particularly ependymoma, also appear at this level, and even anterior meningocele has been known to produce midline erosion.

A feature of chordoma in all locations, but particularly the sacrococcygeal, is the striking extraosseous component that may be present. Bony erosion in such cases can be inconspicuous to the point of being undetectable by roentgenograms, the soft-tissue mass predominating. If the direction of growth is anterior, initial symptoms may be rectal or urinary from impingement on pelvic organs by the soft-tissue mass. Findings can then simulate a presacral growth such as teratoma or cyst. Also to be considered are neoplasms arising from the pelvic organs, such as carcinoma of the rectum with sacral extension. Neurofibroma, a fairly common sacral lesion, can be either intraspinal or presacral in origin.

Cranial Chordomas.—Second in frequency to the caudal group are the cranial chordomas, which account for some 35 to 40% of the total number reported. These arise almost entirely from the region of the spheno-occipital synchondrosis. Extremely rare ectopic sites of origin in the mandible, the maxilla, and the superior occipital bone, however, have been reported. All 10 chordomas in this series apparently originated in the neighborhood of the clivus. By far the most valuable roentgenographic view in identification of these lesions is basilar. In instances where the tumor still is relatively localized, this can be the only projection to demonstrate middle fossa destruction, the routine anteroposterior, posteroanterior, and lateral projections all being negative. With anterior growth, involvement of the sella turcica and parasellar structures often will be evident. Advanced lesions may involve the sphenoid sinus, the nasopharynx, the maxilla, and even the orbit. As in other locations, the soft-tissue component can be considerable, and its intracranial extent is best

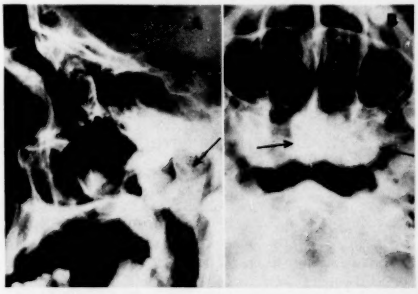

Fig. 5.—Cranial chordoma with nasopharyngeal extension. *A*, lateral skull view is negative except for nasopharyngeal mass. *B*, basilar projection demonstrates eccentric position of mass, and no bony erosion can be identified.

evaluated by air study of the ventricular system. Clinical findings depend on the direction of tumor growth, and Gardner and Turner [5] report posterior extension with involvement of the pons and medulla to be most common. Tumor calcification is uncommon but does occasionally occur and was seen in 1 of the 10 lesions. This calcification can be due either to erosion and incorporation of bone fragments into the mass or to actual calcification of areas of degeneration within the tumor.

It was stated that nasopharyngeal extension occasionally is seen. Figure 5*A* shows a lateral view of the skull of a 59-year-old man whose complaints were diplopia of the left eye and bloody nasal discharge. A large, soft-tissue nasopharyngeal mass was present; the sella turcica appeared normal. Basilar view (fig. 5*B*) failed to demonstrate bony erosion, and the soft-tissue mass was seen to lie almost entirely to the left of the midline. Clinically and roentgenographically this was considered to be a primary nasopharyngeal malignancy; biopsy revealed chordoma. The lesion appar-

ently arose from the base of the skull, with extraosseous extension downward and only minimal bony invasion. This again demonstrates the variability between the degree of bony change and the extraosseous component and how the latter can predominate. A further feature is the eccentricity of growth exhibited, although basically the lesion is of midline origin.

Roentgenographic changes caused by cranial chordoma can in no way be differentiated from those of other neoplasms involving the base of the skull. Craniopharyngioma and carcinoma of the pituitary are rather common destructive lesions of midline origin. A jugular glomangioma and, less commonly, an acoustic neuroma can extend to the midline and produce changes similar to chordoma. A source of very real confusion are neoplasms of the nasopharynx and sphenoid sinuses with extension into the base of the skull. Instances of erosion of bone in this region from sphenoid mucocele have been reported.[6] Extensive metastatic bone destruction in this location is very rare.

Summary

Chordomas are uncommon neoplasms of notochordal origin that must be considered in the differential diagnosis of destructive lesions occurring from the base of of the skull to the coccyx. The clinical findings will vary with the level of the lesion, as will the differential diagnosis. Symptoms often are of long duration, and a preoperative diagnosis is uncommon. The vertebral location is least common; however, this was not true in our series. The radiographic findings in chordoma are not diagnostic at any level and are most variable in the vertebral lesion. The variable features include site, extent and direction of growth, degree of bony destruction, the soft-tissue component, the osteolytic or osteoblastic nature of the lesion, and the condition of the interspace.

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References

1. Utne, J. R., and Pugh, D. G.: Roentgenologic Aspects of Chordoma, Am. J. Roentgenol. **74**:593-608 (Oct.) 1955.

2. Leucutia, T., in Clinical Therapeutic Radiology, edited by U. V. Portmann, New York, Thomas Nelson & Sons, 1950.

3. Mabrey, R. E.: Chordoma: Study of 150 Cases, Am. J. Cancer **25**:501-517 (Nov.) 1935.

4. Wood, E. H., Jr., and Himadi, G. M.: Chordomas: Roentgenologic Study of 16 Cases Previously Unreported, Radiology **54**:706-716 (May) 1950.

5. Gardner, W. J., and Turner, O.: Cranial Chordomas: Clinical and Pathologic Study, Arch. Surg. **42**:411-425 (Feb.) 1941.

6. Simon, H. M., and Tingwald, F. R.: Syndrome Associated with Mucocele of Sphenoid Sinus: Report of Two Cases and Their Radiographic Findings, Radiology **64**:538-545 (April) 1955.

ALPHAPRODINE (NISENTIL) HYDROCHLORIDE IN ANESTHESIA

ITS USE, WITH OR WITHOUT ANTAGONISTS, FOR SUPPLEMENTATION OR AS SOLE AGENT

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and
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• *Alphaprodine (Nisentil) was used as the narcotic analgesic in 209 patients undergoing a variety of major and minor surgical operations. It was given intravenously in amounts ranging from single doses of 30 mg. to multiple doses totaling 1,620 mg. These doses generally exceeded by far what would ordinarily be considered safe; their use was made possible by the simultaneous administration of levallorphan (148 cases) or nalorphine (49 cases), which prevented respiratory depression but did not interfere with the pain-relieving effect. The analgesia so attained was satisfactory, and supplementation with other anesthetics, whether local or general, was in many cases unnecessary. Alphaprodine was thus found to have a high analgesic potency that becomes especially manifest if levallorphan is used at the same time to offset the respiratory depression caused by it. The combination should be used more widely either as the sole anesthetic agent or to supplement others.*

In balanced anesthesia, the basic requirements of successful surgery, viz., analgesia, sleep, and muscular relaxation, are provided by the combined use of anesthetics, sedative-hypnotics, and muscle relaxants. The introduction of curare and curariform agents made it possible to produce relaxation without increasing the depth of anesthesia. As the advent of antagonists to some of the relaxants rendered their use safer, so the development of narcotic antagonists has contributed significantly to the safety of anesthetic procedures that utilize narcotics for supplementation of nitrous oxide–oxygen anesthesia.

The two narcotic antagonists that have been studied widely, both in experimental animals and in man, are nalorphine (N-allylnormorphine, Nalline) hydrochloride and levallorphan (*l*-3-hydroxy-N-allylmorphinan, Lorfan) tartrate. As is seen in the figure, these antagonists differ from the corresponding narcotic analgesics, morphine and levorphanol (Levo-Dromoran) tartrate, in that the methyl group on the nitrogen in the 17 position is replaced by an allyl group.

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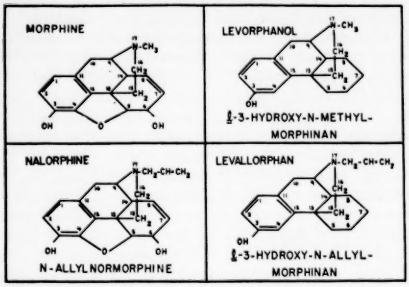
Read before the Section on Anesthesiology at the 105th Annual Meeting of the American Medical Association, Chicago, June 13, 1956.

Narcotic antagonists not only provide a tool to overcome narcotic-induced respiratory depression but may also be used very successfully for prevention of such depression during anesthesia. Foldes[1] reported, in 1955, that levallorphan and alphaprodine (Nisentil)

hydrochloride can be employed advantageously to supplement nitrous oxide–oxygen–thiopental sodium anesthesia. At that time we were studying, on a much smaller scale, certain aspects of the merits of narcotics, particularly alphaprodine, with and without an antagonist, in anesthesia. Foldes' report gave new impetus to our efforts, and we should like to present a summary of our work to date.



Structural formulas, showing chemical relationship between narcotic analgesics, morphine and levorphanol, and their antagonists, nalorphine and levallorphan.

Case Material and Procedure

The study group comprised 224 patients, 218 males and 6 females. Their ages ranged from 4 to 79 years, with an average age of 42.4 years. The types of procedures performed are listed in table 1. As is seen, there were included 146 minor surgical and other procedures and 78 major operations. Of the 43 otorhinolaryngologic operations listed in the former group, 37 were fenestration operations.

TABLE 1.—*Types of Operations*

Minor Surgical and Other Procedures		
Abdominal	7	
Dental	1	
Ophthalmic	16	
Oral endoscopic	25	
Orthopedic	11	
Otorhinolaryngologic	43	
Plastic	11	
Pneumoencephalographic	1	
Surgical, general	26	
Urologic	5	
Subtotal		146
Major Surgical Procedures		
Abdominal	22	
Cardiac	5	
Cephalocervical	21	
Neurosurgical	4	
Orthopedic	6	
Thoracic	10	
Thoracoabdominal	2	
Urologic	8	
Subtotal		78
Total		224

The different drugs used for premedication and their dosages are listed in table 2. The methods of anesthesia employed were as follows. Thiopental sodium given intravenously was used in 4 cases, thiopental sodium given intravenously and nitrous oxide–oxygen in 23, nitrous oxide–oxygen alone in 15, cyclopropane in 2, spinal anesthesia in 4, regional anesthesia in 2, local anesthesia in 103 (including 13 instances in which general anesthesia was given as well), and no anesthesia in 84. In the 84 patients to whom neither local nor general anesthesia was given, as in all other patients, a narcotic analgesic was administered through the rubber sleeve of the infusion tubing.

It is evident from tables 3 and 4 that the narcotic analgesic used was morphine in 15 patients and alphaprodine in the remaining 209. The former received morphine premixed with nalorphine, mostly in a 10:1 ratio. Thus, large doses, totaling as much as 150 mg. of morphine, could be administered in divided doses during operations that lasted three to four hours. Of the 209 patients who were given alphaprodine, 32 received a single dose, ranging from 30 to 120 mg. (average, 62.81 mg.), and 177 were given multiple doses, with totals ranging from 60 to 1,620 mg. (average, 271.86 mg.).

In 12 instances alphaprodine was given without a narcotic antagonist, and 197 patients received alphaprodine premixed with an antagonist. As can be seen also from tables 3 and 4, the antagonist was nalorphine in 49 of these instances and levallorphan in 148 cases.

TABLE 2.—*Drugs Used for Premedication and Their Dosage*

Drug	Dose, Mg.	Route	Patients, No.
Pentobarbital or secobarbital	200-300	Oral	
Morphine sulfate	15	Subcutaneous	81
Scopolamine hydrobromide	0.4	Subcutaneous	
Pentobarbital	100	Oral	
Morphine	15	Subcutaneous	71
Scopolamine*	0.4	Subcutaneous	
Pentobarbital	100	Oral	
Scopolamine*	0.4	Subcutaneous	
or			45
Morphine	15	Subcutaneous	
Scopolamine*	0.4	Subcutaneous	
None	...	...	27
Total			224

* Occasionally 0.4 mg. of atropine sulfate was given instead.

Alphaprodine-levallorphan was employed without local and without general, spinal, or regional anesthesia in 49 of these latter patients and in combination with such anesthetic measures, singly or combined, in 99.

To the initial dose of alphaprodine (usually 30 to 60 mg.), which was administered 5 to 10 minutes prior to any other procedure, a dose of levallorphan equal to one-fiftieth or one-hundredth the dose of the narcotic analgesic was added. Additional fractional doses of alphaprodine were given either premixed with levallorphan in these ratios or without levallorphan; levallorphan alone, however, was subsequently injected in 0.5-mg. doses whenever respirations became too shallow. Thus, alphaprodine-levallorphan was administered premixed throughout the procedures in the 50:1 ratio in 36 instances and in the 100:1 ratio in 51 cases. In 61 patients the initial dose consisted of alphaprodine and levallorphan, but this was followed by alphaprodine alone supplemented by levallorphan as needed.

As indicated above, 84 patients did not receive local, general, spinal, or regional anesthesia. This group consisted of the 49 patients, mentioned above, who were given alphaprodine-levallorphan without other anes-

thetic measures, 27 patients in whom alphaprodine was used conjointly with nalorphine, and 8 patients in whom alphaprodine was employed without a narcotic antagonist. In the latter eight patients, all of whom underwent minor procedures, the total requirement for alphaprodine ranged from 30 to 120 mg. In the 76

TABLE 3.—*Classification of Thirty-seven Patients Who Underwent Fenestration Operations and Received Narcotic Analgesic plus Narcotic Antagonist*

	Patients, No.
Local anesthetic and morphine plus nalorphine, premixed	15
Local anesthetic and alphaprodine plus nalorphine, premixed	4
Alphaprodine plus nalorphine, premixed, without local anesthetic	9
Alphaprodine plus levallorphan, premixed, without local anesthetic	9
Total	37

patients who received alphaprodine and a narcotic antagonist without other anesthetic measures, the dose of alphaprodine varied from 40 to 600 mg.

Forty-six of the patients who underwent major surgery received pentobarbital for induction or supplementation. As for other measures, 43 patients were intubated, 27 received a muscle relaxant, and 10 were given chlorpromazine hydrochloride.

Results

Alphaprodine proved to be a very effective analgesic in 206 of the 209 patients in whom this agent was used, with or without a narcotic antagonist. The three instances in which alphaprodine, combined with levallorphan but without other anesthetic measures, did not produce adequate analgesia occurred in the patients undergoing major surgical procedures. These failures were due to faulty technique rather than to the inadequacy of alphaprodine. Subsequently, anesthesia was instituted with cyclopropane in two and with nitrous oxide, oxygen, and thiopental in one of these patients, who are listed in the third vertical column of table 4.

Except in patients who were given a muscle relaxant for maintenance, clinically significant respiratory depression was very rarely encountered. If this did occur, it was of only short duration and could be corrected by administration of levallorphan or of a few breaths of oxygen by mask.

Spirograms recorded for several patients who received nitrous oxide–oxygen anesthesia supplemented with alphaprodine-levallorphan showed that there was some slowing of respiratory rate and some decrease of tidal volume, usually within two minutes after the initial dose of alphaprodine-levallorphan. This depression was transient, however, and was followed by an increase of depth after about one minute and return of minute volumes to approximate premedication values within two more minutes.

In most patients the doses of alphaprodine employed exceeded by far what would ordinarily be considered a safe dose range. The use of such large quantities of alphaprodine was made possible by the prevention of narcotic-induced respiratory depression by levallorphan. The antagonism against this undesirable effect of alphaprodine did not extend to its analgesic effect or at least did not interfere considerably with its pain-relieving qualities. It may be that in the combination with levallorphan larger doses of alphaprodine were required than if the narcotic analgesic had been used alone. However, levallorphan must have a high degree of selectivity in its antagonism against narcotic-induced respiratory depression, since the analgesia attained was, in general, very satisfactory. Our observations in this respect are in agreement with those of Foldes and co-workers,[1] Kepes and Margolius,[2] Stoelting and Hicks,[3] and Auerbach and Coakley.[4]

At termination of surgery our patients were often awake or could be easily aroused. They hardly ever appeared narcotized. This excellent reactivity of patients immediately after surgery is attributable in part to the short duration of action of alphaprodine. This advantage of alphaprodine was first utilized in anesthesia by Siker and associates,[5] who observed increased controllability of depth of anesthesia. In our patients who received alphaprodine and levallorphan, the excellent postsurgical reactivity may have been due, at least in part, to the analeptic effect of levallorphan. This superiority in the state of consciousness in patients who were anesthetized with nitrous oxide–oxygen supplemented with alphaprodine-levallorphan combinations was first described by Foldes and co-workers[1] and has since been confirmed by Kepes and Margolius[2] and by Stoelting and Hicks.[3]

The doses of alphaprodine used in the patients who received this analgesic without a narcotic antagonist and without other anesthetic measures provided adequate analgesia and were tolerated without significant respiratory depression. The utility of alphaprodine as an analgesic agent outside of the field of obstetrics had been previously suggested. It has been used by McCrea and Post[6] and other groups during cystoscopic procedures; by Gottschalk and co-workers[7] for painful dressings, incisions, and drainage; by Gierson and associates[8] in combination with topical anesthesia for bronchoscopy; and by Weiner[9] in combination with local block or nitrous oxide–oxygen anesthesia for oral surgery.

TABLE 4.—*Classification of 187 Patients Who Underwent Various Surgical or Other Procedures, Excluding Fenestration Operations, and Received Alphaprodine*

	Anesthetic, Type				
	Without Local or General	With Local, Without General	Without Local, With General, Spinal, or Regional	With Local and General	Total
Alphaprodine without antagonist	8	3	1	0	12
Alphaprodine with nalorphine	18	17	0	1	36
Alphaprodine with levallorphan	40	51	36	12	139
Total	66	71	37	13	187

The 76 patients of our series who received alphaprodine and a narcotic antagonist without other anesthetic measures were given doses of alphaprodine considerably larger than those administered to the patients who received this analgesic without a narcotic antagonist. These 76 patients underwent a variety of surgical procedures, mainly of the minor type, but six major operations—three abdominal, two genitourinary, and one orthopedic—were also included. The following case history is illustrative of our experience in this admittedly small group of patients.

A 70-year-old male, weight 76 kg. (168 lb.), was admitted because of massive hemorrhage from gastric ulcers. Physical findings included a left ventricular enlargement and a fairly re-

cent anterior wall infarct. In spite of many transfusions (7,500 cc.) and other supportive measures, the patient remained hypotensive and anemic, with a hemoglobin level of 7 gm. per 100 cc. Since hemorrhage continued, an emergency operation had to be performed. Administration of arterenol (Norepinephrine) was instituted two hours preoperatively. When the patient arrived in the operating room, 60 mg. of alphaprodine and 1.2 mg. of levallorphan were given intravenously. Intubation with tracheobronchial suction was done with the patient conscious. Oxygen was administered, controlled respiration was initiated, and the incision was made. Six milligrams of tubocurarine chloride was given for relaxation. Thirty minutes after the initial dose of alphaprodine was given, another 60 mg. of this analgesic and 0.6 mg. of levallorphan was administered. Administration of arterenol was discontinued. Further fractional doses of alphaprodine and levallorphan, as well as tubocurarine, were given as needed, for a total of 220 mg. of alphaprodine, 3.4 mg. of levallorphan, and 15 mg. of tubocurarine. Arterenol was needed occasionally to support blood pressure. In addition, the patient received a transfusion of 2,000 cc. of fresh blood. Gastrotomy and gross ligation of the ulcer bed was completed in three hours. At the end of surgery the patient was breathing spontaneously, but intermittent positive-pressure breathing was instituted because of his precarious condition. This was continued for four hours postoperatively. The endotracheal tube was left in place for 12 hours. The patient's condition remained critical for three days. He made an uneventful recovery and was discharged one month after admission.

The fact that surgery of this type can be performed without local or general anesthesia proves the high degree of analgesic efficacy inherent in alphaprodine. To be sure, this has been pointed out previously by other workers, but, to the best of our knowledge, alphaprodine was never relied upon, heretofore, as the sole agent for analgesia in major surgery.

Lundy[10] pointed out that the use of drugs that produce analgesia rather than general anesthesia is becoming increasingly important "in the science and art of pain relief." If an analgesic agent dulls sensations to the extent that alphaprodine did in the aforementioned six cases, permitting performance of major surgery without local or general anesthesia, it certainly merits further exploration in our chosen field. To employ alphaprodine safely as the sole analgesic agent in surgery requires the conjoint use of a compound such as levallorphan, which selectively antagonizes the respiratory depression resulting from the large doses of alphaprodine needed.

There were four deaths in this series of 224 patients, none of which was in any way attributable to the drugs or the method used. One patient died from pulmonary embolism three weeks postoperatively, and one died from hepatic coma a week after a successful portacaval shunt. In spite of rigid electrolyte control, this patient's course was rapidly downhill after the fifth postoperative day. The third death occurred from a metastatic abscess of the brain two days after surgery. The fourth patient died from severe cardiac disease and uncontrollable shock during a four-hour exploration for mesenteric thrombosis.

As for side-effects, there were three episodes of convulsions in patients who received very high doses of alphaprodine, namely, 960 mg., 1,200 mg., and 1,620 mg., in combination with doses of levallorphan ranging from 9.6 to 11 mg. These doses were given during operations that lasted for 3⅓ hours, 4½ hours, and 5½ hours respectively. The highest dose of alphaprodine given by Foldes[1] was 780 mg. and that given by Kepes,[2] 700 mg. Since these workers did not observe convulsions, it is possible that the reactions encountered in our series were attributable to the excessive amounts of alphaprodine administered in these instances.

Hyperhidrosis was observed frequently, but it was of no consequence. Furthermore, dizziness occurred often when the initial dose was 60 mg. of alphaprodine and 0.6 or 1.2 mg. of levallorphan. Nausea and vomiting were encountered rarely. Significant changes in blood pressure, pulse rate, and body temperature were not observed. A whealing along the site of the injected vein was present in two instances.

Summary and Conclusions

Two hundred twenty-four patients who underwent surgical procedures were studied. Anesthetic measures included the use of thiopental sodium, nitrous oxide–oxygen with and without thiopental, cyclopropane, and spinal, regional, and local anesthetic. All patients received a narcotic analgesic—alphaprodine (Nisentil) hydrochloride in 209 cases and morphine in 15.

In 197 patients the alphaprodine was combined with a narcotic antagonist; this was nalorphine (N-allylnormorphine, Nalline) hydrochloride in 49 instances and levallorphan (*l*-3-hydroxy-N-allylmorphinan, Lorfan) tartrate in 148. The remaining 12 patients were given alphaprodine without a narcotic antagonist. In the 15 patients in whom morphine was used, this was combined with nalorphine. Alphaprodine and levallorphan were administered in the 50:1 or the 100:1 ratio, premixed throughout the procedures in 87 cases. In 61 patients the initial dose consisted of alphaprodine and levallorphan, but this was followed by alphaprodine alone, supplemented by levallorphan as needed.

In 84 patients, satisfactory operating conditions were obtained with alphaprodine, given alone or in combination with a narcotic antagonist but without general, spinal, or regional anesthesia. The feasibility of such a regimen attests to the high analgesic potency of alphaprodine. The use of alphaprodine as the sole analgesic agent in surgery requires high doses, which can be given safely if levallorphan is administered conjointly. Levallorphan selectively antagonizes the respiratory depression resulting from administration of alphaprodine without considerable interference with its analgesia. When the alphaprodine-levallorphan mixture was employed for supplementation of nitrous oxide–oxygen anesthesia, with or without thiopental, the reactivity of patients immediately after surgery was excellent.

Alphaprodine, combined with levallorphan, should be used more widely as the sole anesthetic agent and to supplement nitrous oxide–oxygen–thiopental anesthesia.

Addendum

Since this report was formulated an additional 30 patients undergoing major operations have received alphaprodine and levallorphan without local or general anesthesia. As in the six cases reported above, large doses of this narcotic analgesic in combination with the narcotic antagonist dulled sensations adequately to permit performance of major surgery, without significant respiratory depression.

800 Poly Pl. (Dr. Lipson).

The alphaprodine hydrochloride and levallorphan tartrate used in this study were supplied as Nisentil and Lorfan, respectively, by Dr. Leo A. Pirk of Hoffmann-La Roche, Inc., Nutley, N. J.

References

1. Foldes, F. F., and others: Levallorphan (Lorfan) and Alphaprodine (Nisentil) in Anesthesia, J. A. M. A. **160**:168-175 (Jan. 21) 1956.

2. Kepes, E. R., and Margolius, B. R.: Effect of Nisentil Hydrochloride and Lorfan Tartrate on Respiration During Nitrous Oxide-Oxygen Anesthesia, Am. J. Surg. **91**:761-768 (May) 1956.

3. Stoelting, V. K., and Hicks, M. L.: Combined Use of Narcotic and Narcotic Antagonist in Supplementation of Anesthesia, Canad. Anaesth. Soc. J. **3**:107-112 (April) 1956.

4. Auerbach, J., and Coakley, C. S.: Effect of Alphaprodine (Nisentil) Hydrochloride and Levallorphan (Lorfan) Tartrate on Respiration, Anesth. & Analg. **35**:460-467 (Sept.-Oct.) 1956.

5. Siker, E. S.; Foldes, F. F.; Pahk, N. M.; and Swerdlow, M.: Comparison of Nisentil and Meperidine for Supplementation of Nitrous Oxide-Oxygen, Thiopental Sodium Anesthesia, Pennsylvania M. J. **58**:702-704 (July) 1955.

6. McCrea, L. E., and Post, E.: Use of Nisentil Hydrochloride as Analgesic Agent During Cystoscopic Procedures, J. Internat. Coll. Surgeons **21**:480-483 (April) 1954.

7. Gottschalk, C.; Orkin, L. R.; and Rovenstine, E. A.: Nisentil: Preliminary Screening Study of Its Clinical Applicability, New York J. Med. **55**:90-94 (Jan. 1) 1955.

8. Gierson, H. W.; Gottlieb, L. S.; and Rubin, H. J.: Nisentil as Analgesic in Bronchoscopy, Dis. Chest **27**:65-68 (Jan.) 1955.

9. Weiner, E.: Nisentil: New Basal Analgesic for Oral Surgery, Internat. J. Anesth. **2**:245-249 (June) 1955.

10. Lundy, J. S.: Development of Analgesia After Century of Anesthesia, J. A. M. A. **157**:1399-1403 (April 16) 1955.

DEAD-SPACE REBREATHING TUBE FOR PREVENTION OF ATELECTASIS

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• *Hyperventilation, useful in preventing or treating atelectasis, was induced by having patients breathe through a sufficiently long tube. A rubber tube with internal diameter of 3.2 cm. and length of 125 cm. was found to add 1,000 cc. to the physiological dead air space and it more than doubled the patient's initial tidal volume. Increasing the volume of the tube caused corresponding increases in the carbon dioxide content of alveolar air and the respiratory minute volume without much rate change. Blowing 100% oxygen into the open end of the tube prevented hypoxia without abolishing the hyperpnea and showed that the alveolar carbon dioxide was the critical factor. The effectiveness of the dead-space rebreathing tube for inducing hyperpnea has been tested in more than 1,000 cases. This device is more effective than the paper bag and less expensive than carbon dioxide. It is recommended for both the prevention of postoperative atelectasis and the treatment of established atelectasis.*

Atelectasis is a common and often dangerous complication, occurring not only after surgery but also in other situations in which the tracheobronchial secretions are not properly cleared. Methods to insure pulmonary aeration and clearance of the tracheobronchial tree constitute a cornerstone in the prevention of atelectasis. The patient who is ill postoperatively, after trauma, or from other causes has therefore been encouraged to cough, to inspire deeply, and to turn or to be turned from side to side at frequent intervals.

The prophylactic effect of hyperventilation induced by carbon dioxide rebreathing was initially demonstrated by Scott and Cutler [1] in 1928. Since then, this prophylaxis has been used widely, either by administering 5% carbon dioxide via a close-fitting face mask or by having the patient rebreathe his own expired carbon dioxide from a paper bag fitted about his mouth and nose. By either method, the increased carbon dioxide tension of the inspired air causes increased arterial carbon dioxide tension, with consequent stimulation of the central nervous system, to produce pulmonary hyperventilation. Practical experience has shown that the usual paper bag, which was often insufficient in volume to accommodate the patient's tidal volume, and constant leaks, which were due to imperfect fitting about the face, made this method inadequate. The administration of 5% carbon dioxide by means of a face-contour mask entailed additional cost and necessary service, since the gas had to be stored in portable tanks and shifted from one bed to another for each rebreathing period.

It is recognized that the addition of an artificial dead space to the already present physiological dead space causes increased inspiratory carbon dioxide tension, increased arterial pCO_2, and consequent increase in pulmonary tidal volume and, therefore, in pulmonary ventilation. Stannard and Russ [2] in 1948 discussed the effects of such added external dead space on pulmonary function in human subjects and reviewed previously presented data.

Inspection of the unpublished individual data presented in summary by Otis and associates [3] indicated to us that it would be practical to design a simple rubber tube with an attached mouthpiece that could be used clinically to produce hyperventilation artificially. Such a tube would have the virtues of simplicity of manufacture and use and would be considerably simpler than the apparatus described by Harbord [4] in 1939, which utilized the same principle in a considerably more complex form.

Previously unpublished detailed data from the department of physiology of the University of Rochester School of Medicine and Dentistry were reexamined and recalculated as background material. Experiments had been performed on seven laboratory personnel to develop a suitable dead-space tube for clinical use.

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After such a tube was standardized, on the basis of new data obtained from nine normal subjects, a series of patients was used to evaluate the tube's clinical application. The use of the dead-space tube was then extended first to a single surgical floor and later to the entire Strong Memorial and Rochester Municipal hospitals to replace completely the previously used paper

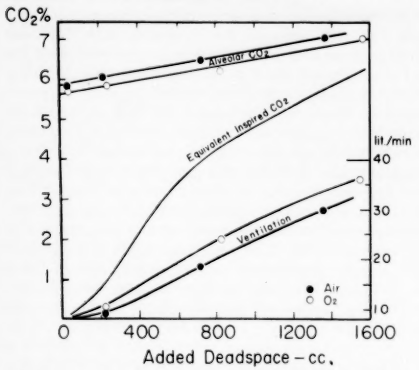

Fig. 1.—Graph showing average data from six normal subjects, represented by solid dots, who breathed air and seven, represented by open circles, who breathed 100% oxygen through added dead-space tubes of varied volume. The percentage of carbon dioxide administered is shown on the left and minute volume of respiration on the right of the graph.

bags and carbon dioxide tanks. To date, the dead-space tube has been used with satisfactory results in well over 1,000 patients, and at present it is in routine use in these hospitals for the prevention of pulmonary atelectasis.

Development of Dead-Space Tube for Clinical Use

Studies of seven healthy laboratory personnel were conducted to measure the physiological effects of added dead space. Each subject sat and rested a minimum of 15 minutes prior to each determination. A

TABLE 1.—*Summary of Data Obtained from Seven Subjects in Dead-Space Breathing Experiments**

Breathing	Added Dead Space, Cc.	Alveolar CO_2, %	Tidal Volume, Cc.	Respiratory Rate, Min.	Minute Volume, Liters
Air	35	5.8	685	13.2	8.4
Oxygen	40	5.7	610	13.1	8.0
Air	225	6.1	715	12.6	9.0
Oxygen	250	5.8	770	14.0	10.8
Air	720	6.5	1120	16.7	18.7
Oxygen	825	6.2	1350	18.1	24.4
Air	1360	7.1	1680	18.1	30.4
Oxygen	1575	7.1	1970	18.6	36.8

* All measurements made 10 to 15 minutes after rebreathing began.

mouthpiece was connected to rubber hoses of varied lengths to furnish added dead space. The subject inspired through the tube from room air and expired through the tube into a large spirometer. Heart rate, respiratory rate, and pulmonary minute volume were frequently measured. Determinations of alveolar pCO_2 were made between 10 and 12 minutes after the initiation of the test, and the carbon dioxide tension was determined by Haldane gas analysis. The dead space of the rubber tube apparatus was measured by water displacement. The total dead space and inspired carbon dioxide tension were calculated by assuming that the composition of dead-space gas at the end of expiration was the same as alveolar gas composition and that complete inspiratory mixing of this dead space and added room air occurred.

Figure 1 shows the average data from six normal subjects who breathed room air through the dead-space tube and from seven normal subjects who breathed 100% oxygen through the tube. This graph and table 1 indicate the following conclusions. Changes both in alveolar carbon dioxide and in minute volume of ventilation have a nearly linear relationship with added dead space. The response to breathing 100% oxygen is nearly the same as that to breathing room air. Since the tidal volume must be larger than the added dead space plus the physiological dead space, the frequency of breathing is not much altered by the additional dead space. In these tests, the frequency of breathing changed from a resting value of 13 to 19 respirations per minute for the largest dead space. For each 500-cc. addition of dead space the original resting minute volume approximately doubled.

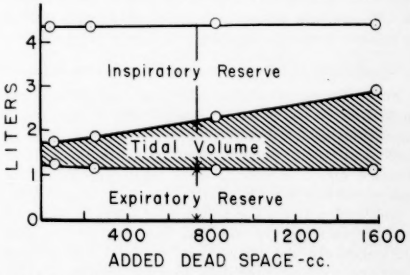

Fig. 2.—Graph showing average effect of different added dead spaces on the inspiratory and expiratory reserve and the tidal volume of six normal subjects.

One can compare to these data on breathing 100% oxygen the ventilatory response produced by inhaling a carbon dioxide gas mixture. The data of Gray [3] on the effect of inspired carbon dioxide and ventilatory response yield the equivalent inspired carbon dioxide curve shown in figure 1. For example, the addition of 800 cc. of dead space is equivalent in ventilatory response to the inhaling of a 4.2% carbon dioxide gas mixture. Figure 2 shows how the increased ventilation is obtained entirely from the inspiratory reserve volume. The expiratory reserve, or functional residual capacity, remains constant.

Further studies were performed on nine normal persons. Each one lay supine with his head supported on a pillow, simulating a patient (fig. 3). A nose clip was applied, and the subject first respired by means of a rubber mouthpiece attached to a reversible one-way valve. Inspiration was from room air, and expiration was through an electrically recording rapid-flow gas meter, from which minute volume could be calculated. Respiratory rate was noted and tidal volume computed. After a 10-minute control period, one of several

rubber tubes was inserted between the mouthpiece and the valve, thereby adding respiratory dead space, and a 10-minute test run was made.

The average tidal volume of the nine subjects was 594 cc., and test runs demonstrated an average increase of 770 cc., which resulted in a "stimulated tidal volume" of 1,364 cc. if a 1,000-cc. dead-space tube were

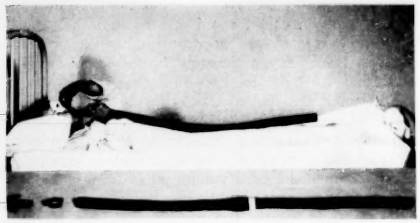

Fig. 3.—Photograph showing (*above*) dead-space tube in routine use and (*below*) component parts of tube: rubber mouthpiece, metal adapter, and 1,000-cc. black rubber dead-space tube.

used. This 1,000-cc. tube (fig. 3) made of black rubber, with an internal diameter of 3.2 cm. and a length of 125 cm., was therefore selected for further testing because it more than doubled the control tidal volume.

Evaluation of Effectiveness of Dead-Space Tube

Fourteen patients who had had various surgical procedures were studied. Control tidal volumes and stimulated tidal volumes, obtained by the addition of 1,000 cc. of dead space, were measured by the method outlined above. Readings were taken preoperatively and on the first three days after the operation (table 2).

In all 14 patients the addition of 1,000 cc. of dead space approximately doubled the control volumes preoperatively and more than doubled the control values on the first three days after the operation. (The actual tidal volume during the period of dead-space rebreathing was less than the 1,000 cc. of added dead space, suggesting that streaming of gas through the tube produces an "effective" added dead space, which is less than the actual tube volume.) There was no significant alteration of the respiratory rate. The tube

Table 2.—*Average Tidal Volume of Fourteen Patients Studied Preoperatively and During the First Three Days After Operation*

Day	Control Rate, Tidal Vol./Cc.	1,000 Cc. Added Dead Space, Tidal Vol./Cc.	Increase, %
Preoperative	458	904	97
1st postoperative	401	922	130
2nd postoperative	410	925	126
3rd postoperative	418	942	127

proved easy for the patient to use with only brief instruction. No particular distress was caused during hyperventilation.

Relationship Between Stimulated Tidal Volume, pCO_2, and pO_2.—Tidal volumes, alveolar pCO_2, and alveolar pO_2 were measured during a 5-minute control period and 10 minutes of respiring through the tube providing 1,000 cc. of added dead space. Data were determined using the rapid-flow gas meter combined with a Rahn continuous alveolar air sampler.[6] Fifteen subjects were selected from patients with normal pulmonary function. The results were uniform, and figure 4 represents the average tidal volume, alveolar pCO_2, and alveolar pO_2 of the 15 subjects during the control period and during each of the 10-minute periods of respiration through a tube providing 1,000 cc. of added dead space.

The pCO_2 and tidal volume curves closely parallel each other, as they did in figure 1. The greatest increment in stimulated tidal volume occurred during the first two minutes, during which time the tidal volume increased from a control value of 596 cc. to 1,178 cc. During the third minute there was a smaller but nevertheless significant increase in tidal volume to 1,334 cc. From the 3rd through the 10th minute there was little change in the stimulated tidal volume. Similarly, the greatest rise in alveolar pCO_2 from a control value of 39.4 to 44.2 mm. Hg occurred during the first two minutes. A second increase from 44.2 to 47.2 mm. Hg was noted between the second and fifth minutes, and for the remainder of the 10 minutes the alveolar pCO_2 remained relatively stable. The alveolar pO_2 sharply diminished from a control value of 100.5 to 77.6 mm. Hg during the first two minutes of hyperventilation and over the remaining eight minutes steadily and gradually rose to 88.9 mm. Hg.

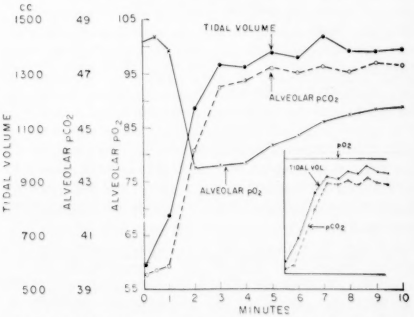

Fig. 4.—Graph showing relationship of average tidal volume, alveolar pO_2, and alveolar pCO_2 of 15 normal subjects breathing room air through the 1,000-cc. dead-space tube. There was a decrease in alveolar pO_2 when the subjects breathed room air (*main graph*). The normal alveolar pO_2 was maintained in three subjects when 3 to 4 liters of 100% oxygen per minute was introduced into the distal end of the tube (*insert*).

The same study was repeated with a flow of 3 to 4 liters of 100% oxygen per minute introduced into the distal end of the rebreathing tube for three subjects. The average increases in tidal volume and pCO_2 of 700 cc. and 7.2 mm. Hg, respectively, were similar to the changes noted in the 15 patients breathing room air. However, in all three patients the pO_2 was maintained above the control value of 100.5 mm. Hg (fig. 4, *insert*). This indicates that, while the subjects breathe through the 1,000-cc. dead-space tube, the elevation of pCO_2 is the critical factor effecting an increase in tidal volume. Further, the addition of 100% oxygen, blown into the end of the tube, prevents even small degrees of hypoxia.

Clinical Experience.—Over 1,000 patients at the Strong Memorial and Rochester Municipal hospitals have now used the dead-space rebreathing tube, as a

postoperative routine. The tube has been used for a period of five minutes at two-hour intervals. Its use has caused an apparent decrease in the incidence of postoperative atelectasis, and it has been effective in the therapy of established atelectasis. It has been the opinion of patients, nurses, inhalation therapists, and physicians that the tube is far easier and more effective than paper-bag rebreathing and more practical than rebreathing carbon dioxide by means of a face-contour mask. Since initiation of this tube rebreathing program, there has been no occasion to use carbon dioxide in either the prophylaxis or the therapeutics of atelectasis, and the paper-bag method of rebreathing has been discontinued. The purpose of the tube is briefly explained to the patient, the mouthpiece is placed, and the patient's nares are occluded by the fingers of either patient or attendant. During each four-to-five-minute period of hyperventilation the attendant remains to insure that the nasal airway is occluded and that the lips are closed about the mouthpiece. Stuporous patients are enabled to use the tube by insertion of the mouthpiece by the attendant.

Occasionally patients have objected to the hyperventilation caused by the tube, particularly if the chest motion caused incisional pain. However, they have agreed that this is preferable to vigorous endotracheal suctioning or bronchoscopy, which may be necessary if failure of prophylaxis allows atelectasis to occur. No difficulties due to hypoxia have been observed, although only an occasional patient has received oxygen through the distal end of the tube.

Comment

Hyperventilation with its attending alveolar distention and stimulation of coughing is an important factor in the prevention of atelectasis. An increase in the alveolar pCO_2 raises the arterial pCO_2, which by stimulation of the central nervous system causes hyperventilation. The addition of 1,000 cc. of dead space into the respiratory passage causes an effective rise in alveolar pCO_2 and therefore increases the respiratory tidal volume without greatly increasing respiratory rate and avoids the complex methods described previously.[7] With the use of the dead-space tube, the patient need only keep the rubber mouthpiece in his mouth while he or the nurse pinches the nostrils shut, and no additional cooperation is required. Subjectively, patients have found this method easier than either the use of the paper bag or 5% carbon dioxide delivered by means of a face-contour mask. The period of rebreathing for five minutes every two hours has proved effective. As indicated in figure 4, the tidal volume is doubled by the end of three minutes of rebreathing, stabilizes at this point, and then remains stable. The patient using the five-minute therapeutic period is therefore actually rebreathing at a stimulated tidal volume of twice the normal control value for at least two minutes.

The marked decrease in pO_2, which rises after two minutes (fig. 4), is ordinarily well tolerated by the patient. In those individuals in whom hypoxia is a concern, a flow of 3 to 4 liters per minute of 100% oxygen can be directed into the distal end of the rebreathing tube. This procedure results in the maintenance of normal pO_2 while hyperventilation is accomplished. This constitutes a distinct advantage over the paper-bag method, in which there is a constantly decreasing supply of alveolar oxygen.

It has been noted that the use of the dead-space tube in patients with increased tracheobronchial secretions has stimulated an effective cough, which is desirable in the treatment of atelectasis. It is postulated that the hyperventilation and increased velocity of the respiratory gases through the tracheobronchial tree causes agitation and redistribution of the secretions into areas where they are effective in stimulating cough reflex.

Summary

A method of inducing hyperventilation by means of the addition of 1,000 cc. of dead space in the form of a rubber tube through which the patient breathes has been tested for use in the prevention of atelectasis. Physiological studies demonstrated a linear relationship between minute volume and alveolar carbon dioxide tension with the addition of dead space. The response with breathing 100% oxygen is nearly the same as with breathing room air and the frequency of breathing is little altered.

Studies on normal individuals and patients after operation demonstrate that the addition of the 1,000-cc. dead-space tube approximately doubles the control values. There is a parallel relationship between the tidal volume and the alveolar pCO_2, with a concomitant decrease in pO_2. These changes reach an equilibrium after three minutes of rebreathing through the dead-space tube. The decrease in pO_2 can be prevented by directing a flow of oxygen into the distal end of the rubber tube.

Clinical evaluation of rebreathing through the dead-space tube in over 1,000 patients indicates that this method is more effective than rebreathing in a paper bag and more practical than rebreathing carbon dioxide by means of a face-contour mask. No difficulties have been encountered in use of what has now become a routine procedure for prophylaxis of pulmonary complications at the Strong Memorial and Rochester Municipal hospitals.

260 Crittenden Blvd. (20) (Dr. Dale).

References

1. Scott, W. J. M., and Cutler, E. C.: Postoperative Massive Atelectasis: Effect of Hyperventilation with Carbon Dioxide, J. A. M. A. **90:**1759-1763 (June 2) 1928.

2. Stannard, J. N., and Russ, E. M.: Estimation of Critical Dead Space in Respiratory Protective Devices, J. Appl. Physiol. **1:**326-332 (Oct.) 1948.

3. Otis, A. B., Rahn, H.; Epstein, M. A.; and Fenn, W. O.: Performance as Related to Composition of Alveolar Air, Am. J. Physiol. **146:**207-221 (May) 1946.

4. Harbord, R. P.: Auto-inhalational Carbon-Dioxide Therapy, Brit. J. Anaesth. **17:**13-15 (Dec.) 1939.

5. Gray, J. S.: Pulmonary Ventilation and Its Physiological Regulations, edited by R. F. Pitts, Springfield, Ill., Charles C Thomas, Publisher, 1950, p. 82.

6. Rahn, H.; Mohney, J.; Otis, A. B.; and Fenn, W. O.: Method for Continuous Analysis of Alveolar Air, J. Aviation Med. **17:**173-178 (April) 1946.

7. Duomarco, J., and Díaz-Romero, C.: Investigaciones sobre la fisio-patología de la respiración: La prolongación del especio muerto respiratorio como medio práctico de hiperventilación pulmonar, Arch. urug. med. **10:**599-606 (May) 1937. Footnotes 1 and 4.

CLINICAL NOTES

CERVICAL MEDIASTINAL LYMPH NODE BIOPSY IN EVALUATING INTRATHORACIC DISEASE

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Biopsy of palpably enlarged peripheral lymph nodes has been used for many years to establish the nature and extent of intrathoracic lesions. In 1949, Daniels [1] suggested that biopsy of deep, nonpalpable lymph nodes of the lower neck and upper mediastinum be performed to diagnose such lesions when there is no palpable supraclavicular node enlargement. He reported five instances in which this technique yielded a diagnosis not obtainable by any other method than that of exploratory thoracotomy. Further reports of the successful use of this technique of prescalene lymph node biopsy were made by Weiss and co-workers,[2] Johnson and MacCurdy,[3] and Storey and Reynolds.[4] Evaluations of prescalene node biopsy in larger series of patients were later reported by Shefts and co-workers,[5] Cuykendall,[6] Harken and co-workers,[7] and Connar.[8]

Intrathoracic lesions in which examination of the prescalene lymph nodes has yielded a positive diagnosis include bronchogenic carcinoma, metastatic cancer to the lungs, carcinoma of the esophagus, plasmacytoma, Hodgkin's disease, lymphosarcoma, sarcoidosis (Boeck's sarcoid), tuberculosis, histoplasmosis, and silicosis. Harken and co-workers [7] further utilized the technique to determine the operability of cases of bronchogenic carcinoma. They felt that thoracic exploration was not warranted in those patients who had carcinoma involving the prescalene lymph nodes.

This paper summarizes the reported results from the literature of the technique of prescalene lymph node biopsy and the results of its use in an additional 35 patients of our own.

Materials and Methods

Prescalene lymph node biopsies were performed on 35 patients with intrathoracic lesions admitted to the thoracic surgical service of the Grace–New Haven Community Hospital during an 18-month period beginning in June, 1954. None of these patients had palpably enlarged peripheral lymph nodes; excluded were eight patients for whom supraclavicular node biopsies had been performed for palpably enlarged nodes.

The procedure of node biopsy was not used as a routine but was applied as a diagnostic measure when other techniques had failed to elicit a histological diagnosis. In certain instances the method was used to determine the possible extension of known intrathoracic malignancy.

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The operative approach is identical to that used in procedures on the cervical portion of the phrenic nerve. With the patient in a semisitting position, the neck is extended and the head rotated away from the side of operation. The anesthesia is induced by local infiltration with 0.5% solution of procaine hydrochloride. A 4-cm. incision is made parallel to the clavicle and about 2 cm. above it, over the lateral border of the sternocleidomastoid muscle. After transection of the platysma fibers, the posterior edge of the sternocleidomastoid muscle is retracted medially, exposing the prescalene fat pad. This fat pad is dissected free and excised. The posterior belly of the omohyoid muscle, the internal jugular vein, and the transverse cervical and transverse scapular vessels are encountered in the course of the dissection. These structures are preserved, although division of the transverse cervical and transverse scapular vessels may occasionally facilitate the dissection. The phrenic nerve, as it crosses the anterior surface of the anterior scalene muscle, is exposed and carefully preserved. Care should be taken to avoid injury to the thoracic duct on the left side.

Digital exploration of the paratracheal mediastinum, as recommended by Harken and co-workers,[7] was carried out in the majority of the procedures. In two instances, biopsy specimens were taken of lymph nodes that could be palpated in this region. A unilateral exploration was carried out in every patient, in 19 patients on the right side and in 16 on the left side. The choice of side was based upon the evident extent of intrathoracic disease as determined by physical and radiographic examinations, as well as upon the anatomy of the lymphatic pathways within the thorax. All specimens were submitted for routine histological examination. Lymph nodes suitable for study were found in every specimen, even though nodes may not have been recognized grossly in the fat pad at the time of operation.

Results

In 11 of the 35 patients (31.4%), histological examination of the prescalene lymph nodes yielded a positive tissue diagnosis. In 8 of the 11, the tissue diagnosis thus secured was not obtainable by bronchoscopy, cytological examination of the sputum and bronchial washings, or any other means than that of exploratory thoracotomy. A positive lymph node biopsy specimen was secured in 6 of the 22 patients (27.2%) who had bronchogenic carcinoma. No complications were observed as a result of the operative procedure.

The clinical diagnoses in the 35 patients are tabulated in table 1. In the four patients with diagnoses of chronic pleuritis or effusion and of nonspecific organiz-

ing pneumonitis and pulmonary fibrosis, the diseases were classified on clinical grounds alone. The diagnosis of mediastinal lymphoma was also made on the basis of clinical findings, supported by response to radiation therapy. In three patients with a diagnosis of bronchogenic carcinoma, no histological confirmation was obtained, but the diagnosis appeared justified on the basis of the clinical findings and the radiographic appearance of the lesion, together with evidence of metastatic disease elsewhere. In the remaining 19 patients with bronchogenic carcinoma, the diagnosis was established histologically from material obtained at thoracotomy, by cytological examination of sputum or bronchial washings, or by prescalene lymph node biopsy (6 patients).

TABLE 1.—*Diagnoses in Thirty-five Patients with Intrathoracic Disease in Whom Prescalene Lymph Node Biopsy Was Done*

Final Diagnosis	Patients, No.	Positive Biopsies, No.
Bronchogenic carcinoma	21	6
Bronchogenic carcinoma and pulmonary tuberculosis	1	0
Pulmonary tuberculosis	1	1*
Hodgkin's disease	2	2
Carcinoma in substernal thyroid	1	1
Sarcoidosis	1	1
Pericardial sarcoma	1	0
Mediastinal lymphoma	1	0
Esophageal carcinoma	1	0
Multiple myeloma and organizing pneumonitis	1	0
Chronic pleuritis or effusion, undetermined etiology	2	0
Organizing pneumonitis and pulmonary fibrosis	2	0
Total	35	11(31.4%)

* Nonspecific granuloma compatible with tuberculosis.

The prescalene lymph nodes are histologically involved by the extension from the primary intrathoracic disease process in about one-third of cases of chronic intrathoracic disease, particularly bronchogenic carcinoma, sarcoidosis, lymphoma, and the granulomas. The results, as reported by several authors, of the use of prescalene lymph node biopsy in such cases compare fairly closely with our own experience (table 3).

TABLE 3.—*Results of Use of Prescalene Lymph Node Biopsy in Reported Series of Patients with Intrathoracic Disease*

Observer	Patients, No.	Positive Biopsies, No.	Positive Biopsies, %
Shefts and co-workers[5]	187	67	35.8
Cuykendall[6]	41	8	19.5
Harken and co-workers[7]	142	45	31.7
Connar[8]	50	14	28.0
This series	35	11	31.4
	455	145	31.8%

Summary and Conclusions

The technique of biopsy of deep, nonpalpable lymph nodes of the lower neck and upper mediastinum (prescalene lymph node biopsy) is safe, relatively simple, and useful in establishing both the nature and the extent of intrathoracic disease. As suggested by several authors, the usefulness of prescalene node biopsy material may be amplified by bacterial and fungus culture studies in addition to usual histological examination. Prescalene node biopsy in patients without palpable node enlargement augments the number of positive histological diagnoses attainable without resorting to exploratory thoracotomy. During the 18-month period in which the 35 patients here reported were seen,

TABLE 2.—*Comparison of Results of Prescalene Lymph Node Biopsy with Those of Other Diagnostic Procedures in Twenty-two Patients with Bronchogenic Carcinoma Who Did Not Have Palpable Lymph Nodes*

Case	Prescalene Lymph Node Biopsy	Bronchoscopy: Biopsy	Bronchoscopy: Cytology	Sputum Cytology	Thoracotomy	Clinical Diagnosis Only	Final Diagnosis
1	— *	—	+	—	Not done	Not done	Pulmonary tuberculosis and carcinoma of right upper lobe
2	—	—	—	—	Not done	+	Carcinoma of right upper lobe with osseous metastases
3	—	+	—	Not done	+	Not done	Epidermoid carcinoma of right lower lobe
4	—	—	—	+	Not done	Not done	Carcinoma of right upper lobe
5	—	+	+	+	Not done	Not done	Anaplastic carcinoma of right upper lobe
6	—	+	—	—	Not done	Not done	Anaplastic carcinoma of left upper lobe
7	—	Not done	Not done	—	Not done	+	Carcinoma of left upper lobe with pleural effusion
8	—	+	—	+	+	Not done	Epidermoid carcinoma of right lower lobe
9	+ †	—	—	—	Not done	Not done	Anaplastic carcinoma of right upper lobe (tumors generally)
10	+	—	—	Not done	Not done	Not done	Anaplastic carcinoma of right upper lobe
11	—	+	+	+	Not done	Not done	Adenocarcinoma of right lung
12	—	+	—	+	+	Not done	Epidermoid carcinoma of left lung
13	+	+	—	Not done	Not done	Not done	Epidermoid carcinoma of left upper lobe
14	—	—	—	—	+	Not done	Epidermoid carcinoma of left upper lobe
15	—	—	—	+	+	Not done	Epidermoid carcinoma of right upper lobe
16	—	—	—	—	+	Not done	Anaplastic carcinoma of right middle lobe
17	—	—	+	+	Not done	Not done	Carcinoma of left upper lobe with rib destruction
18	+	—	—	—	Not done	Not done	Adenocarcinoma of left upper lobe
19	+	—	—	+	Not done	Not done	Adenocarcinoma of left lung
20	—	—	—	—	Not done	+	Carcinoma of left lung with hilar and osseous metastases
21	—	—	—	—	+	Not done	Adenocarcinoma of left upper lobe
22	+	+	+	+	Not done	Not done	Epidermoid carcinoma of right upper lobe
Totals	6	8	5	9	7	3	

* Negative.
† Positive.

An analysis of the results of diagnostic study of the patients with bronchogenic carcinoma is presented in table 2. Thoracotomy was not performed in any of the patients who had carcinomatous involvement of the prescalene lymph node.

biopsy specimens of palpably enlarged supraclavicular lymph nodes were taken in 8 patients with chronic intrathoracic disease; in 7, a positive histological diagnosis was obtained. A definitive histological diagnosis would not have been possible in 8 of the 11 patients

in our series if the use of the prescalene biopsy procedure had been restricted to those patients with palpable supraclavicular lymph nodes.

Involvement of the prescalene lymph nodes with bronchogenic carcinoma indicates incurability by our present therapeutic techniques. Six of our cases were classified as inoperable, not only because of the node involvement but also because of other clinical reasons. However, since lobectomy or pneumonectomy affords palliation in some instances where the symptomatology relates to bronchial obstruction, infection, or bleeding, incurable cases may at times be considered for some form of resectional procedure.

Although no complications from the procedure of prescalene lymph node biopsy were encountered in our series, the operator should, nevertheless, be alert to the special possibilities of pneumothorax from puncture of the apical pleura; paralysis of the hemidiaphragm secondary to phrenic nerve injury; brachial plexus injury; air embolus into an open venous channel; lymphatic fistula; and the less specific complications of hemorrhage and infection.

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References

1. Daniels, A. C.: Method of Biopsy Useful in Diagnosing Certain Intrathoracic Diseases, Dis. Chest **16**:360-366 (Sept.) 1949.

2. Weiss, H. A.; Campbell, R. M.; and Budenz, G. C.: Sarcoidosis Diagnosed by Means of Subclavian Node Biopsy: Report of Case, J. A. M. A. **146**:1221-1222 (July 28) 1951.

3. Johnson, J. E., Jr., and MacCurdy, J. M.: Pulmonary Histoplasmosis Diagnosed by Scalene Node Biopsy, Am. Rev. Tuberc. **66**:497-500 (Oct.) 1952.

4. Storey, C. F., and Reynolds, B. M.: Biopsy Techniques in Diagnosis of Intrathoracic Lesions: Including Lung Biopsy, Mediastinal Biopsy and Resection of Deep Cervical Fat Pad and Its Contained Nodes: Report of 12 Illustrative Cases, Dis. Chest **23**:357-382 (April) 1953.

5. Shefts, L. M.; Terrill, A. A.; and Swindell, H.: Scalene Node Biopsy, Am. Rev. Tuberc. **68**:505-522 (Oct.) 1953.

6. Cuykendall, J. H.: Use of Prescalene Lymph Node Biopsy in Absence of Palpable Supraclavicular Nodes: Report of 41 Cases, J. A. M. A. **155**:741-742 (June 19) 1954.

7. Harken, D. E.; Black, H.; Clauss, R.; and Farrand, R.: Simple Cervicomediastinal Exploration for Tissue Diagnosis of Intrathoracic Disease: With Comments on Recognition of Inoperable Carcinoma of Lung, New England J. Med. **251**:1041-1044 (Dec. 23) 1954.

8. Connar, R. G.: Prescalene and Deep Cervical Lymph Node Biopsy, Surg. Gynec. & Obst. **101**:732-743 (Dec.) 1955.

COUNCIL ON DRUGS

Formerly the Council on Pharmacy and Chemistry

Report to the Council

The Council has authorized publication of the following report.

H. D. KAUTZ, M.D., *Secretary.*

The lack of identification of hazardous ingredients and precautionary labeling on the wide variety of small, packaged chemical items in general use and the influence of this lack of identification on their careless and improper handling and storage is the underlying theme of this report. The Board of Trustees of the American Medical Association recently authorized the Committee on Toxicology to develop model legislation on labeling of the many possibly harmful chemicals not now so regulated. It was recommended that interested organizations and individuals with experience in this problem be invited to collaborate. A legislative conference to consider the formulation of a uniform chemical label law will be held on completion of a current study of existing statutes pertaining to the labeling of chemicals.

BERNARD E. CONLEY, PH.D., *Secretary, Committee on Toxicology.*

HEALTH PROBLEMS OCCURRING FROM HOUSEHOLD CHEMICALS, INCLUDING DRUGS

Irvin Kerlan, M.D., Washington, D. C.

In 1955[1] solid and liquid substances were designated as the causative agents in 1,431 deaths due to accidental poisoning. Gases and vapors were responsible for 1,163 deaths. Suicide from self-inflicted poisoning from solid and liquid substances and gases accounted for 3,429 additional deaths. For practical purposes these 6,023 deaths occur in and about the home. Of the 1,431 accidental poisonings by liquid and solid substances, 358 occurred in children under 5 years of age; 44 of the 1,163 deaths due to gases and vapors were found in children under 5 years.

These imposing statistics do not give us an absolute picture of the problem; the number of nonfatal poisonings is estimated to be 100 to 150 times the number of

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Based on an address read before the Second Symposium on Hazardous Household Chemicals and Agricultural Poisons, sponsored by the Committee on Toxicology and the Committee on Pesticides, American Medical Association, at the annual meeting of the American Association for the Advancement of Science, Atlanta, Ga., Dec. 29, 1955.

fatalities. It should be recognized, too, that, although the present death rate for all types of poisoning from solid and liquid substances is about one-third that of 50 years ago, the total number of preventable deaths continues to be a large and impressive one.

Prevention

In evaluating the persistently high number of accidental poisonings (from household products) that have a causal relationship to environmental factors, it becomes apparent that many individuals do not regard as harmful many liquid or solid substances that they know are inedible. For example, physicians appreciate this fact when called to treat the child who has ingested furniture polish, left accessible by his mother, who did not know that such polish may be capable of poisoning.

This unawareness may be caused by a lack of informative and precautionary labeling on numerous household items to identify their composition; their potentialities for harm, if any; directions for safe use; and methods of emergency treatment in case of misuse. Lack of this type of information on the many different items available in every pantry, medicine cabinet, basement, garage, and elsewhere around the home may serve as an important basis for careless or improper handling or storage. The Committee on Toxicology of the American Medical Association estimates that there are a quarter of a million different brand-name products available.

Inadequate information on the label is an important gap in protection of the consumer against accidental poisoning by household products because it is a major obstacle to the successful attack on the problem. Not only does the failure to label household articles informatively create circumstances that lead to accidents, but it frequently enhances their seriousness by complicating proper treatment. Physicians or others providing emergency treatment need to know the identity of the offending substance. Lack of this information frequently results in the use of vague and indefinite terminology and consequently poor case-recording. Thus, unsatisfactory treatment of the patient may occur as well as inaccurate statistics, which tend to obscure the problem and thus complicate its solution.

To ascertain the contents of potentially harmful household products in order to assist physicians, pharmacists, and others who seek such information in emergency situations, Rodman [2] conducted an extensive survey of various manufacturers regarding household products not covered by existing federal laws. He concluded that there is need for more adequate labeling of articles concerning contents and precautions against misuse as well as for prompt and continued education of users.

Hazardous Household Items

Household articles may be readily separated into two groups on the basis of whether their labeling and packaging are subject to federal statutory control in the interest of protection of the consumer against accidental poisoning (see table). Certain states and municipalities have taken forthright steps to control some of these offending items.

Drugs and disinfectants intended for use on man and animals are subject to the Federal Food, Drug, and Cosmetic Act of 1938, enforced by the Food and Drug Administration. Disinfectants for inanimate objects and pesticides are subject to the Insecticide, Fungicide, and Rodenticide Act of 1947, enforced by the United States Department of Agriculture. Recently the FDA procedure for setting safe tolerances for pesticides on crops was revised and simplified. The 12 caustic and corrosive acids and alkalis in certain concentrations designated in the Federal Caustic Poison Act of 1927 are also controlled by the FDA. The latter legislation was achieved through the efforts of the American Medical Association. Although many new chemicals have been introduced since the enactment of the law, it has never been amended to provide for these developments.

Status of Household Articles Under Federal Laws Regarding Identity of Contents and Precautions in Labeling

Regulated	Nonregulated
Drugs	Cosmetics
Disinfectants	Heating, power, and lighting fuels
Economic poisons (pesticides)	Household care and repair articles, including water repellents, leather dressings, preservatives
Caustic and corrosive acids and alkalis	Household cleansers (other than acids and alkalis), including soaps and other detergents, solvent cleaning fluids, polishes and waxes, deodorizers
	Paint and accessories, including thinners, removers
	Miscellaneous items, such as toys, inks and dyes, hobby supplies, novelties

All the federal laws cited have the common requirement that the active ingredients be declared on labels by their common names, together with directions for use and warnings against injury under specified conditions of use. In addition, the 12 caustics and corrosives and those pesticides (economic poisons), deemed highly toxic to man must carry the poison legend and directions for emergency treatment.

Drugs

Among the drugs, methyl salicylate, aspirin, certain other salicylates, and iron deserve to be specially mentioned, particularly with regard to poisoning in children.

Since methyl salicylate has a long history of fatalities caused by accidental ingestion, the FDA requires that the label of any drug containing over 5% of this chemical bear a conspicuous warning that it be kept out of the reach of children. This warning has been widely adopted. With proper attention to this admonition, a reduction in serious poisonings and deaths from misuse of this drug should be achieved.

Aspirin and other salicylates are among the substances most frequently misused by children. This fact is revealed by morbidity statistics compiled by the poisoning control centers, sponsored by the American

Academy of Pediatrics and other health groups, and by mortality statistics of the National Office of Vital Statistics. On Feb. 14, 1955, the FDA invited the Medical Advisory Panel on the Accidental Ingestion and Misuse of Salicylate Preparations by Children to consider this problem and its solution in the interest of protecting the public health. As a result, the following recommendations were made concerning the labeling that should be employed for salicylate preparations to meet the requirements of certain provisions of the Federal Food, Drug, and Cosmetic Act. A period of six months from the date of publication [3] was allowed for modification of existing labeling to comply with these requirements.

1. The labels of such preparations should carry a warning, such as the following:

"Warning: Keep out of the reach of children" or "Warning: Keep this and all medications out of the reach of children."

Some manufacturers seem to agree with the broad educational and constructive aspects of this latter caution and are voluntarily considering its use on many other types of medications.

2. In lieu of specific dosage recommendations for children under 3 years of age, the directions for oral use of salicylate preparations should bear a statement such as:

"For children under 3 years of age consult your physician."

Some physicians who have attributed the major problem of salicylates not only to their widespread availability but also to the introduction of "baby size" or "candy type" aspirin have questioned the philosophy of "candy" medication.[4]

Iron sulfate is generally regarded as one of the safest medicaments to have on hand in the home. Because of its ready availability, however, serious poisonings and deaths have been reported within recent years, with a frequency that has become the basis for much concern. The antihistaminics and other recently introduced drugs are misused by children and appear as causative agents in poisonings. Only when it is widely recognized that drugs should be used carefully and stored out of the reach of children may we expect progress in curtailing the present incidence of accidental poisoning.

Pesticides

With the rapid general introduction of potent new insecticides and rodenticides after World War II, the already sizable pesticide problem was increased. Trouble has been caused in the past by the moth repellents containing camphor, naphthalene, or *p*-dichlorobenzene; the roach poisons containing fluorine; and the rat poisons containing arsenic, phosphorus, or thallium. Recently the so-called organic phosphorus insecticides, chlordane, chlorophenothane (DDT), sodium fluoroacetate (1080), and others, have been responsible for deaths and severe poisonings despite the stringent provisions of existing legislation.

Acids and Alkalis

Deaths and serious poisoning from lye and other caustic and corrosive acids and alkalis covered by the Federal Caustic Poison Act have declined markedly in most sections of the country. This decrease is attributable in great part to informative labeling and effective law enforcement. Because of certain deficiencies in the law itself as well as social and economic factors beyond statutory control, this group of substances continues to be a problem in certain areas among certain groups. Lye continues to be one of the most frequently offending agents among low-income groups in the South, where the home manufacture of soap is quite common. Several years ago pediatricians in North Carolina tried without success to have its sale for consumer use banned entirely in that state.

Paints, Cleansers, Cosmetics, and Miscellaneous Agents

Since paints, cleansers, cosmetics, and miscellaneous agents have much in common with regard to ingredients and labeling, we can consider them together. The labeling in none of these groups is required by federal legislation to reveal information concerning composition or hazards arising with their use or misuse. In those instances in which manufacturers supply such helpful information it is done voluntarily, in compliance with some industry code, or according to local regulations. For example, the American Standards Association issued a standard [5] limiting the lead content in paint for interior use in dwelling units or on furniture or toys. The amount must not exceed 1% of lead of the total weight of the contained solid.

Because of lack of declaration of components, especially the potentially harmful ones, this particular group of products presents some of the greatest problems. Among the items of concern are the solvents, including petroleum products, carbon tetrachloride, and benzene. The serious and fatal poisonings from the inhalation of cleaning fluids containing carbon tetrachloride prompted the New York City Health Department to add a new section to its sanitary code requiring that cleaning fluid containing carbon tetrachloride be prominently labeled together with warnings against its misuse. Later the departments of health of the state of New York and the city of New York jointly enacted amendments to their sanitary codes, requiring that hazardous substances in any product in general use be revealed on the label and adequate warnings provided against their misuse.

The question may arise why cosmetics are not included with drugs as controlled by the Food, Drug, and Cosmetic Act. Although the law protects the consumer from dangerous cosmetics under customary conditions of use and requires that the label bear a statement of quantity of contents and the name and address of the manufacturer or distributor, it does not require a declaration of ingredients.

Prevention and Control of Accidental Poisoning

The conviction that accidental poisoning can be prevented through education, adequate labeling, and continued attention to collection of accurate statistics on morbidity and mortality has encouraged health departments, medical societies, major insurance companies, the American Red Cross, the National Safety Council, and others to undertake protective measures.

Through the concerted efforts of the American Academy of Pediatrics and local health departments, poison control centers have been set up and are operating in 15 cities in Florida and the following other cities:

Albany, N. Y., Atlantic City, N. J., Baltimore, Boston, Buffalo, Chicago, Denver, Durham, N. C., Grand Rapids, Mich., Harrisburg, Pa., Indianapolis, Kansas City, Mo., Lancaster, Pa., Louisville, Ky., Memphis, Tenn., Milwaukee, Montclair, N. J., Newark, N. J., New Bedford, Mass., New York, Nutley, N. J., Oklahoma City, Phoenix, Ariz., Rochester, N. Y., Seattle, Springfield, Ill., Syracuse, N. Y., Washington, D. C., and Worcester, Mass.

Other cities are actively developing poison control centers. Through these centers the attending physician can obtain information concerning the composition of substances involved in poisonings as well as methods of treatment. In turn, he can contribute to the knowledge of substances that are accidentally ingested and acquaint parents with home-safety measures. As this program has progressed and extended nationwide, an awareness has developed of the need for a national center to furnish information to the physician concerning the composition of household articles, collect and evaluate reports of poisoning, and distribute information regarding preventive procedures.

The American Medical Association is devoting special attention to the correction of the accidental misuse of chemical agents found in and around the home through its Committee on Toxicology. The Committee has undertaken a five-point program to (1) encourage informative labeling and safe packaging; (2) stimulate laboratory and clinical research for antidotes; (3) standardize technical nomenclature; (4) develop criteria for evaluating hazardous substances; and (5) sponsor a sustained educational program.

The American Public Health Association has recently established a subcommittee on chemical poisons, which will concern itself with the role of organized public health activities in the prevention and control of accidental poisoning. It will study the problem in all age groups, and its activities will include case-finding, analysis of the factors involved in the etiology, studies of methods of treatment, and the development of a program of prevention and control.

As an informational guide to parents, physicians, hospitals, poison control centers, and others concerned with the prevention of accidental poisoning, the FDA has recently issued a circular titled Protect Your Family Against Poisoning. This provides a series of reminders regarding the handling and storage of drugs, poisons, and other household chemicals.

Summary

Throughout the country during the past five years, increased interest in poisoning in the home has produced considerable progress toward the solution of the problem. Much more cooperative effort must be expended, however, in (1) extending our knowledge as to the identity and nature of hazardous substances, including methods of diagnosis and treatment of poisoning arising from them; (2) promoting safe labeling and packaging of household chemicals; (3) restricting from the home environment substances whose hazardous natures outweigh their usefulness; and (4) educating the consumer in the safe use and storage of all nonfood substances.

References

1. Vital Statistics of the United States, 1955, vol. 2. United States Department of Health, Education, and Welfare, National Office of Vital Statistics, to be published.

2. Rodman, M. J.: Survey of Potentially Harmful Household Products, J. Pediat. **46**:171-181 (Feb.) 1955.

3. Federal Register, Oct. 15, 1955.

4. Candy Medication and Accidental Poisoning, report of the Committee on Toxicology to the Council on Pharmacy and Chemistry, J. A. M. A. **158**:44-45 (May 7) 1955.

5. American Standards Specifications to Minimize Hazards to Children from Residual Surface Coating Materials, American Standards Association, Sponsored by American Academy of Pediatrics, Approved Feb. 16, 1955.

Gallstones in Children.—The high incidence of jaundice and low incidence of common-duct stones seems to be best explained by a very acute inflammatory process in the gall bladder, which in children lies quite close to the common duct. The proximity of the structures could produce intermittent common-duct obstruction. The passage of small common-duct stones could account for the jaundice, but this is less likely. Cholelithiasis is frequently related to excessive excretion of pigments due to hemolytic anemia. The significance of this association is important, because if hemolytic anemia is present proper therapy usually consists of splenectomy followed by cholecystectomy at a second operation. . . . If the stones are small a waiting period with repeat cholecystogram may be tried. . . . In a high-grade common-duct obstruction, duct exploration may be required first. Splenectomy and common-duct exploration should not be done together because of the high risk of severe or fatal shock. Cholecystitis without cholelithiasis occurs particularly in association with acute infectious diseases such as peritonitis and meningitis. . . . The incidence of carcinoma of the gall bladder in young adults and adolescents [is] the same as in the older population, approximately 2%. Cholecystic disease is a complication of more than 50% of patients having hemolytic jaundice. It does not follow that patients with cholecystic disease have a high incidence of hemolytic disease.—D. P. Babbitt, M.D., Gallstones in Children, *A. M. A. Archives of Diseases of Children*, July, 1956.

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ADENOMAS OF THE COLON AND RECTUM

GUEST EDITORIAL

Robert Turell, M.D.

The existing confusion about colorectal adenomas is largely the result of their variable biological behavior pattern, which is inevitable, and partly the result of the failure of many writers to state the precise basis for their diagnosis, which is avoidable. Preventable bewilderment is also caused by the clinical use of such terms as "malignant adenoma" or "adenocarcinoma, grade 1," which are purported to connote a benign process, while the term "invasive adenoma" is applied to connote cancer. The terms "atypical" and "carcinoma in situ" appear to convey benignity to some clinicians and malignancy to others. This chaos of names has clouded our clear ideas and thoughts. The family tendency toward the development of solitary or scattered adenomas has received but scant attention.

To avoid misleading connotations, adenomas are best thought of as being either benign or malignant. Malignancy in adenomas is regarded as noninvasive or invasive, the determining or boundary line of invasion being the muscularis mucosae. The diagnosis should be made emphatically unequivocal. Equivocation invariably results in frustration and therapeutic inaction. The clinician should effect a close liaison with his pathologist as well as the radiologist and talk the same language.

The aim should be at providing the pathologist with the entire lesion, in one piece or in several large segments, for microscopy, although this is not always feasible. This implies "total" biopsy as against "fractional" biopsy. In the latter procedure, usually bits of tissue are removed from the surface of the polyp, thus missing the interior of the body or the base of the lesion. Only an occasional very flat lesion that has an elevation of barely 2 to 3 mm. from the mucosal surface has to be subjected to fractional biopsy. Diagnostic temporizing with an adenoma by piecemeal removal of bits of tissue at various intervals of time amounts to halfway measures that are inexcusable.

Parenthetically, many pathologists of experience maintain great reservations about determination of the histological character of adenomatous polyps solely with use of the frozen section technique, since the best of them can be deceived in both directions, the benign and malignant.

Unequivocal noninvasive malignancy determined cytologically occurs almost exclusively in the bodies or tips of long-pedicled or short-pedicled adenomas; a recent analysis of 200 sessile adenomas, exclusive of mucosal excrescences, yielded only one questionable example of noninvasive malignancy. Some observers question the alleged difference between the cancer potential of villous and smooth adenomas; these lesions are either benign or the seat of frank invasive cancer at the time of the initial examination. Villous adenomas are encountered frequently enough in patients in the third and fourth decades of life to question their alleged occurrence only in the older-age group of patients. Infrequently, a combination of villous and smooth areas is encountered in the same adenomatous polyp—most of these are short-pedicled.

The malignant potential and the metamorphic forces, or transition from adenomas to carcinoma, are recognized clinical observations; hence the loose term "premalignant" or "precancerous," which according to Levin is essentially a statistical one indicating a greater probability of developing cancer. The inexpert is understandingly perplexed, because at one extreme there is the published guess, practically impossible to verify scientifically, that all colonic adenomas are carcinomas or will become cancers if they are not destroyed and if the patient lives long enough. At the other extreme is the belief, based on a clinical study, that rectal adenomas are either malignant initially or tend to become malignant early and that they do not become malignant over the course of time. It is now almost generally conceded that, while colorectal adenomas have an undeniable propensity to undergo malignant transformation, some may nevertheless remain benign. However, since there are no gross or microscopic criteria that will enable the clinician or the pathologist to predict a benign course for a given adenoma, or when malignant transformation might be expected, extirpation of all colorectal adenomas is advised upon recognition in the absence of systemic contraindications, as a matter of cancer prophylaxis, even if only a minority of colorectal adenomas do become cancers.

The contemporary literature is full of quibbling about the incidence of asymptomatic adenomas in the general population; the reported incidence varies from 1.6 to over 12%. When symptoms do occur, bleeding, overt or occult, is the cardinal warning. The blood loss resulting from adenomas is usually intermittent, slow, and small in amounts rather than profuse or sudden. It is worth noting that adenomas are seldom thought of as a source of blood loss in cases of iron-deficiency anemia. The presence of reduced blood volume caused by blood loss, which in turn is produced by a bleeding adenoma, may occasionally mimic a clinical picture of heart disease. The reverse is also sometimes true:

Blood loss with a resulting anemia is explained by an existing adenoma, and a systemic disorder, such as a blood dyscrasia, is overlooked for some time.

About 90% of adenomas of the colon are discovered on sigmoidoscopy. This lopsided 9 to 1 ratio is proof that radiography fails to detect, at least temporarily, a significant number of small adenomas that are situated above the reach of the 25-to-30-cm. sigmoidoscope. Parenthetically, sigmoidoscopy, as a part of a thorough physical examination, is every clinician's "business"; it does not require a proctologist.

The management of adenomas still poses controversies and disagreements. Mucosal excrescences and the tiny sessile or pedunculate lesions are removed by means of the cold biopsy forceps, which procedure is preferably followed by coagulation of the base. Most of the small and medium sessile and practically all pedunculate lesions that are situated within the reach of the sigmoidoscope and whose site of origin can be visualized well are removed with the electrothermic snare. The large sessile lesions, especially when situated on the posterior or lateral walls of the rectum, are removed with the electric double-loop resector. All of these maneuvers not only constitute good therapy but, importantly, secure the specimen, no matter how small, for the ultimate goal—microscopic examination. When a pedunculate adenoma is removed by means of a snare at its base and subsequent microscopy reveals noninvasive malignancy within its body or in the stalk near the body, no further treatment need as a rule be instituted, provided the remaining pedicle is long and free from malignancy upon serial sections. It should be stressed that a pedicle is a fairly good guarantee against local recurrence but is no guarantee against distant metastatic spread via the embolic route. The use of surgical diathermy requires dexterity, practice, and experience; it is not without risk.

For the eradication of sessile adenomas situated beyond the reach of the sigmoidoscope, segmental resection of the adenoma-bearing segment of the colon is invariably employed. However, a few pioneering surgeons are advocating subtotal colectomy with ileoproctotomy for the eradication of this lesion for the same reasons they advocate this radical operation for cancer of the colon anywhere above the rectosigmoid. For the eradication of solitary pedunculate adenomas situated in this high area, conventional polypectomy through a colotomy incision is still the most popular operation. Here again some pioneering surgeons advocate segmental intestinal resection and a few advise subtotal colectomy. For the elimination of multiple discrete or scattered adenomas, subtotal colectomy appears to be a superior operation than polypectomy through multiple colotomy incisions, even with addition of endoscopy through these colonic incisions. Admittedly, coloscopy has disclosed unsuspected adenomas, but it is also known to have failed to reveal existing adenomas, thus creating a false sense of security in some instances. The method of extended colotomy incisions, in the search of small adenomas, is said to have decided clinical value, especially where coloscopy is unrevealing. In short, for the eradication of adenomas situated above the reach of the 25-to-30-cm. sigmoidoscope (as for familial polyposis), modern treatment has tended to become increasingly more radical.

Adenomas in juvenile patients should also be removed upon recognition, but radical procedures appear unnecessary, as malignancy in solitary adenomas rarely, if ever, occurs. Patients with adenomas are observed periodically for their lifetime, in order to detect new or recurrent lesions at the earliest time. Thus it is apparent that, although some aspects of adenomas have no ready solution, a relatively uniform pattern of thinking and therapeutic action is nevertheless discernible.

MEDICAL SERVICE SOCIETY OF AMERICA

There is, roughly, one detail man for every 16 physicians practicing in the United States. Some of these 10,000 men, through a growing society known as the Medical Service Society of America, have embarked on a twofold program, both phases intended to help American medicine. The first is an attempt to set professional standards for all detail men. Of significance, these standards would be formulated not as personal opinions but as a result of conferences with representatives of organized medicine and drug management, with the dominating theme being to help these men to be of greater service to the practitioner. To aid them in achieving their objectives, these professional representatives have devised a code of ethics. One particular part of that code stands out: "He [the detail man] will respect a doctor's professional status and not abuse the privileges and courtesies extended to him in his line of duty."

The second goal of this professional group is the indirect performance of medical public relations, by helping the doctor explain medical services to the public. The Medical Service Society of America also wishes to share in showing its appreciation of doctors, by its annual project of presenting a plaque and key to the General Practitioner of the Year, as selected by the American Medical Association. Other projects include the support of various civic activities, both medical and nonmedical. Some examples are the Westchester County, New York, chapter's recognition of the Medical Receptionist of the Year and its nursing scholarship. The Oklahoma City chapter's activities include helping with literature on diabetes for their county medical society and operation of a message-center service at the annual Oklahoma Medical Convention.

The purpose of the Medical Service Society is to unite its members in the closest bonds of good fellowship and to promote a closer business and social relationship between its members and the various professions with which they are associated; to uphold the principles of good government; and to teach that organization, cooperation, and reciprocity are better than rivalry, strife, and destructive competition. A coordinated program between doctors and detail men could result in thousands of new ambassadors for American medicine.

ORGANIZATION SECTION

SUMMARY OF THE 17TH ANNUAL CONGRESS ON INDUSTRIAL HEALTH

Remarkable progress in reducing health hazards and a 30% drop in accidental deaths from 1940 to 1955 were hailed as major contributions of industrial medicine during the 17th Annual Congress on Industrial Health held Feb. 4-6, in Los Angeles.

This progress was cited in a keynote address by Dr. Dwight H. Murray, Napa, Calif., A. M. A. President. The Congress, attended by some 750 persons, was sponsored by the A. M. A.'s Council on Industrial Health and six other cooperating groups.

During the Congress, the annual award of the President's Committee on Employment of the Physically Handicapped was given to Dr. Rufus Baker Crain, Rochester, N. Y., because of his advice and assistance in the fields of physical demands, analysis, and rehabilitation of the handicapped, particularly those with heart disease. He is on the staff of the University of Rochester and is a district medical consultant to the New York State Division of Vocational Rehabilitation.

Eye Injuries

In the first day's session on vision, Dr. Franklin Foote, New York, executive director, National Society for the Prevention of Blindness, pointed out that more than 90% of all industrial eye accidents are "needless and preventable." He said that many cases of eye disease that can cause permanent impairment or loss of vision can be caught if detected early. Four testing methods have been developed to find potential cases—visual acuity tests, ophthalmoscopic examination of the fundi, tonometry, and screening of visual fields.

While early diagnosis is important in disease, prevention is also needed in the problem of accidental eye injuries, according to James E. O'Neill, director of the society's industrial service. "The task of wiping the safety slate clean of eye accidents is as easy as rolling off the proverbial log," he said. "And the excuses still being offered as a substitute for measurable results simply won't stand close examination. . . . The way to eliminate needless eye injury and loss of sight is to eliminate what is known as job-selection protection."

In other words, safety eye-wear should not be worn just by those working in known hazardous areas. It should be provided for all employees, and for visitors. The rules must be mandatory, and employees must be educated to protect themselves. O'Neill said that "those who wear eye protection are not becoming part of the eye injury statistics."

He suggested that medical, management, and safety personnel, key supervisors, in some cases, and always labor representatives should decide together on a sight-saving program for their own situations.

Eye injuries resulting from chemicals can be prevented from causing serious damage if prompt action is taken, according to practicing physician Dr. Ralph Ryan, Morgantown, W. Va. He said the first treatment for a worker injured by chemicals "must be at or near his place of work. The loss of an extra minute before the chemical is washed out with water or physiological saline may mean loss of useful vision to the eye. Water is the most universally available irrigating material. Therefore employees exposed to harmful chemicals should be given training in recognizing the quickest means of washing an injured eye."

O'Neill emphasized that the lid must be opened, which can be done with the fingers, and that plenty of water should be used. The eye should be washed without stopping for at least 10 minutes. Almost any source of water will do, but in areas where hazards are great, a bottle of sterile isotonic sodium chloride (physiological saline) solution or water with a siphon rubber hose may be arranged over a bench or low table where the injured worker may be laid on his back for eye irrigation.

Color Blindness

Some false notions about color blindness and its effect on a worker's job ability were corrected by Commander Dean Farnsworth, of the U. S. Naval Medical Research Laboratory, Naval Submarine Base, New London, Conn. He said:

"Ten per cent of American men, but only one per cent of the women are color blind; it is inherited, usually from a man's mother's father; it is not curable nor can it be remedied; it cannot be acquired by alcohol, tobacco, sickness, or any other means; color blind persons, with a few rare exceptions, are not insensitive to all color."

Commander Farnsworth explained that there are three types of color-blind persons: protans, or red-green confusors who see yellow and green but to whom red and blue-green appears gray; deutans, who see yellow and blue but to whom greens and red-purples look gray; and tritans, who see red and green but to whom yellow and blue look gray.

Among them there are degrees: the mildly color blind person gets along with colors; the moderately color blind has difficulties with colored insulation on wiring; the severely color blind cannot handle color coding.

Preservation of Hearing

Speakers pointed out in the session on this topic that rapid screening with a simplified test and better records were major factors in the problem of hearing loss due to noise in industry or to other causes.

Dr. Howard House, chairman, subcommittee on noise in industry, American Academy of Ophthalmology and Otolaryngology, Los Angeles, said 1 in 10 persons in the United States has a hearing impairment. Many can be treated; some have permanent impairment. Many conditions are reversible if they are found early, and others are preventable.

"If you have to shout to be heard" in your industry, "you have a noise problem," Dr. House said. He recommended analysis of noise exposure; if it is of the type and intensity to produce possible hearing damage, then the noise should be controlled either by stopping it at the source by means of isolation, changes in method of operation, quieting the machinery, or sound treating the environment or by stopping it at the individual level by ear protection devices including muffs or plugs, or both.

He recommended that every employee be given a preemployment hearing test with periodic checkups to detect changes. This can be done in a rapid screening method with use of the "single frequency test," which does not require highly trained personnel or soundproofed rooms.

This test, plus standard data forms for recording hearing and hearing impairment, is the major contribution to hearing conservation, according to Dr. Aram Glorig, director of research for the same committee.

Dr. Glorig said hearing tests are "essential in industry" and must be part of the preemployment examination and later follow-ups. He noted that four major factors characterize noise exposure in industry: the over-all noise level, the frequency or composition of the noise, the duration and time distribution during the typical work-day and work-life of an employee, and the total exposure during work-life.

In preserving hearing, Dr. Walter Rosenblith of the Massachusetts Institute of Technology said that since communication is the major need for most people, the standards must be based on "hearing for speech."

If this kind of hearing can be protected and preserved among older people it would accomplish two important goals, he said: it will make it easier for them to adjust psychologically to their rapidly changing environment, and it will lighten the load of those who "produce the goods and provide the services" in a nation in which "the proportion of older people is increasing rapidly."

Treatment of Burns

In the final session on burns, speakers agreed generally that the "exposure method" is best for mass casualty situations. A new modification of this method was described; tests show that it could be used for care of burned children at home or by the burned person himself in event of atomic attack when medical personnel will be in short supply.

Lieut. Col. Robert D. Pillsbury, director of the surgical research unit at Brooke Army Hospital, and Commander George T. Van Petten, U. S. Naval Hospital, Newport, R. I., reported on their use of the exposure method on a mass basis.

Commander Van Petten, who directed a "serious-case" ward after the disastrous explosion and fire on the U.S.S. Bennington, aircraft carrier, said exposure is the only "workable method" for mass burn situations such as in the Coconut Grove, Texas City, Hartford Circus, and Bennington disasters, or for atomic attacks.

"It is therefore of utmost importance that workers in all phases of medicine, first aid, nursing and associated fields not only have a thorough working knowledge of the general management of burns but also realize the advantages and peculiarities of the . . . exposure technique," he said.

In general, in this method, burned surfaces are left open to air without any medication. Loose skin is removed and the area washed with saline solution. Blisters are left intact. Further skin removal is done at the first sign of infection, and infected blisters are removed. Later skin grafting may be done.

An aluminum powder dusting, which provides a tough but pliable covering for burns, has been used successfully at the Hospital for Sick Children in Toronto, Canada, according to Dr. M. D. Maxmen of the hospital staff. He said this method can be applied so easily that parents may use it at home for burned children and that 600 such cases handled this way in Toronto showed no complications.

In large casualty situations where treatment would be in the hands of lesser trained persons or the victims themselves, treatment with aluminum powder for the first 48 hours could be done "with a minimum of effort," he said.

STATEMENT BY DR. EDWIN S. HAMILTON ON H. R. 58 BEFORE COMMITTEE ON VETERANS' AFFAIRS OF THE HOUSE OF REPRESENTATIVES

I am Dr. Edwin S. Hamilton of Kankakee, Ill., where I am engaged in the private practice of medicine. I am a member of the Board of Trustees of the American Medical Association, on whose behalf this statement is presented. I am accompanied by Dr. Russell Roth, a member of the Committee on Federal Medical Services of our Council on Medical Service.

With your permission, Mr. Chairman, I should like to discuss briefly the history of our association's interest in veterans' medical affairs and our basic philosophy and position with respect to the medical care of veterans by the federal government. Dr. Roth will address himself to the specific provisions of H. R. 58.

We are keenly aware of the very serious effort which has been made by this committee and the Veterans' Administration to solve the problems of providing the best possible medical and hospital care for the veterans of this country. I assure you that we are anxious to be of assistance in achieving this objective.

Since 1925, when the House of Delegates of the American Medical Association first considered the medical provisions of the World War Veterans Act of 1924, the Association has been in close and constant touch with the medical activities of the Veterans' Administration. In the intervening years, our House of Delegates has considered various aspects of veterans' medical affairs on more than forty occasions. In 1951, a special committee of the Association conducted an exhaustive study into various facets of the veterans' medical program. Copies of its report were submitted to your Subcommittee on Hospitals.

The Association now has a permanent committee known as the Committee on Federal Medical Services which is primarily concerned with veterans' medical

affairs. This committee publishes a periodic newsletter and sponsors numerous national and regional conferences on veterans' medical subjects. The Committee has been instrumental in organizing Committees on Veterans' Care in the State Medical Societies of almost every state in the Union. In addition, the Committee has held numerous conferences with officials of the Veterans' Administration and has worked closely with various major veterans' organizations and allied health associations.

The recommendations of the American Medical Association as regards the admission of veterans in veterans' hospital facilities have been based on a continuing interest in this matter. They were clearly restated by our House of Delegates at its last meeting in November, 1956. We recommend that:

(1) The best possible medical and hospital care be furnished by the federal government to those veterans who have suffered physical or mental disabilities as a result of military service.

(2) This medical and hospital care be limited to service-incurred or aggravated disabilities and not be provided for veterans with non-service-connected diseases and disabilities.

A temporary exception to this policy was recognized in 1953 as regards veterans with non-service-connected tuberculosis, psychiatric and neurological disorders. With your permission, Dr. Roth will discuss this exception in greater detail.

The American Medical Association is and always has been in complete agreement that the federal government has a duty to care for any man who has become physically or mentally diseased or disabled as a result of military service. We believe, however, that as a long-range policy the provision of medical and hospital care for veterans with non-service-connected disabilities by the federal government is unsound. We do not believe that the federal government should continue to engage in a gigantic medical care program in competition with state, local and private medical institutions, especially in view of the fact that the majority of patients in veterans' facilities are suffering from non-service-connected ailments. We do not believe that the ever-increasing cost of the present veterans' medical care program is a proper burden to impose on the taxpayers of this country. Finally, we feel that the consideration of veterans' medical problems must be ultimately predicated upon a concern for the health and welfare of the entire population and not just a particular segment.

We think that the present policy of providing medical care, under a federal program, for veterans who are supposedly unable to pay for that care is unsound. Such care is properly a matter of personal responsibility or a function of state and local governments.

We believe that there are abuses of the present law and regulations as regards the care of veterans with non-service-connected disabilities. Therefore, we are in favor of the enactment of H. R. 58 which will, in our opinion, serve to correct many of these abuses. Although this measure does not go as far as our policy recommends, it is certainly a step in the right direction. We feel that veterans with non-service-connected disabilities who have private resources or those who are covered by private medical and hospital insurance plans and workman's compensation should not be cared for in veterans' hospital facilities.

With your permission, Mr. Chairman, Dr. Roth will now discuss the pending bill in relation to the policy which I have just stated.

STATEMENT BY DR. RUSSELL B. ROTH ON H. R. 58 BEFORE COMMITTEE ON VETERANS' AFFAIRS OF THE HOUSE OF REPRESENTATIVES

I am Dr. Russell B. Roth, of Erie, Pa., where I am engaged in the private practice of medicine. I am a member of the American Medical Association's Committee on Federal Medical Services, the activities of which have been briefly described to you by Dr. Hamilton.

Dr. Hamilton has reviewed for you the continuing concern of the A. M. A. with proper medical care for veterans, and its enunciation in 1953 of a policy advocating new legislation to provide that eligibility for VA medical care be restricted to:

(A) Veterans with peacetime or wartime service whose disabilities or diseases are service connected or service aggravated.

(B) Within the limits of existing facilities, to veterans with wartime service suffering from tuberculosis or psychiatric or neurological disorders of non-service-connected origin, who are unable to defray the expenses of necessary hospitalization.

It was emphasized that the entire matter of non-service-connected care deserved reanalysis by Congress, and that exceptions to the basic policy were being made in respect to tuberculosis and neuropsychiatric disorders on a purely temporary basis.

This policy was widely discussed throughout the nation, and it soon became apparent that these specific temporary exceptions were difficult to defend with justice. We approved VA hospitalization for veterans with tuberculosis or neuropsychiatric problems, but not for those with serious, long-term heart disease, crippling arthritis, or cancer. It became increasingly obvious that to rate eligibility in terms of the nature of the disease was inequitable, and that emphasis should be placed on the economic impact of the illness on the veteran and his family.

In consequence, in 1956, the basic policy was restated. It asserts our unaltered conviction that the only true mission of the VA Department of Medicine and Surgery is to provide fine medical care for service-connected ills, and that legislation should be prepared to limit its activities to this work. Our statement now makes certain recommendations concerning compliance with the present law until it may be amended. It is recommended that all states and appropriate county medical societies form committees to help insure that service-connected cases, which have now dwindled to a mere 15% of annual admissions, do not become relegated to the background in the VA hospital picture, and that, so long as non-service-connected cases are legally eligible, priority may be sought for those veterans of limited means whose

illnesses require long-term hospitalization, the expenses of which cannot reasonably be met by private resources or ordinary insurance coverage. This is based on the knowledge that there is no major shortage in this nation in respect to facilities for the provision of short-term medical or surgical care, or for the acute illness in contrast to chronic disease.

We have studied carefully the wording of H. R. 58 and find ourselves in accord with its provisions. Section (b) (1) which requires listing of pertinent insurance coverage, seems especially suitable, and we would respectfully suggest adding to this a question as to whether or not the illness or injury involved is covered by workman's compensation inasmuch as it has never seemed realistic to us to consider as "unable to pay" those veterans whose expenses would be covered totally or in large part by any form of insurance. We feel that to object to the provisions of H. R. 58 is to foster a disregard for the intent of a law which limits the care of non-service-connected cases to those unable to pay, and which requires a statement under oath from each applicant to this effect.

In this connection we particularly approve the provisions of Section (c) which, for the first time, attempts to furnish for the applicant an estimate of the magnitude of the expense of hospitalization and treatment on which he may base his answers as to his ability to meet it.

One must recognize that there is a significant inclination on the part of many individuals to exploit all available loopholes to avoid paying for medical care. This is not limited to VA, but has become a major problem for insurance carriers and for all charitable medical care facilities. It seems desirable for the government to inject into its dealings with applicants for tax-paid medical care the same measure of regard for sound business practice which it attempts to assert in other economic dealings with its citizens. Even income tax statements are subject to verification. For this reason we feel that the present law should be amended to permit investigation of the financial status of applicants for non-service-connected care.

I would like to commend Congressmen Teague for his introduction and sponsorship of H. R. 58, and I should like to voice an appreciation for the immense amount of time and effort given by this committee in its attention to the health problems of veterans which have become such a significant portion of the over-all health problems of the nation. We trust that our major allegation as to the need for a redefinition of the mission of the VA in medical care will still command your attention and merit your study, and in the meantime we are pleased to support this bill as a sound and progressive measure.

MEDICAL EDUCATION LEADERS DISCUSS FUTURE PROGRAMS

The tremendous recent expansion of medical science and its effect on medical education was a major concern of nearly 1,000 participants at the 53rd Annual Congress on Medical Education and Licensure Feb. 9-12 at Chicago, sponsored by the Council on Medical Education and Hospitals of the American Medical Association.

The efforts of all sectors of medical education in making men "fit" to practice medicine while this expansion continues were considered from several viewpoints. Setting the background for them was Dr. Herman Weiskotten, Skaneateles, N. Y., retiring Chairman of the Council, who defended current medical education while pointing out future needs. He said critics of medical schools generally have no firsthand information and are usually persons with "special interests" in the socioeconomic, psychological, or public health fields. The provision of full-time competent faculties, properly equipped laboratories, and the expansion of research in schools have provided an atmosphere of untold importance in the scholarly growth of medical students.

Need for Education Beyond Medical School

Dr. Dwight Murray, Napa, Calif., A. M. A. President, said that since the four years of undergraduate training are too short to learn "everything," medical education must continue throughout the doctor's life. A major need today is for expansion of postgraduate work to keep the doctor "a truly fit practitioner."

By "fit practitioner" Dr. Murray said he meant a doctor possessed of "a sense of personal dedication to scientific humanitarian service, a dedication to the ideas of the medical profession . . . honesty (intellectual as well as moral) and an over-all high standard of personal ethics, the willingness to work hard and continuously, a lively curiosity about people and processes, emotional stability, and a sympathetic personality."

Unfortunately, the "demanding period of training, with its inevitable economic strain, has become so long that it is beginning to discourage candidates from entering the field of medicine," according to Dr. W. Barry Wood, vice president of the Johns Hopkins medical institutions. Many young men have to enter private practice immediately on graduation because they cannot afford hospital residency experience.

"Such shortcuts to practice in this age of expanding science deprives society of the maximal return on its investment in medical manpower," he said.

One attempt to correct this is the long-range plan at Harvard where efforts to attract talented students to medicine are based on two factors—shortening the course of training for physicians by two years, and cutting accordingly the now almost prohibitive costs of medical education.

The objectives are to break down "the presently existing barrier" between the liberal arts and the medical sciences and, thus, to not only liberalize training of medical students but also bring the school of medicine into closer collaboration with the rest of the university; to add strength in the basic science departments of the medical school "on the grounds that these departments must, in the final analysis, serve as the foundation of clinical medicine and public health."

Scientific Training

The notion that "scientific training dries up the milk of human kindness" was attacked by Dr. Dana W. Atchley, professor of clinical medicine, Columbia University College of Physicians and Surgeons.

Stating that a physician must be "first of all a scientist," Dr. Atchley said that educators seeking to produce the ideal physician should try to select cultivated men and women. However, they can be made into complete physicians capable of coping with the complex and changing field of medicine in only one way: "by establishing an atmosphere of sound critical thinking, in an environment dedicated to advancing the science that is the physician's unique contribution to man's health and happiness."

Because facts become outdated so quickly today, a new physician must rely on himself to evaluate new knowledge. His scientific growth depends more on "how he learned to use his mind rather than on what he was able to store in it during medical school."

"It is through the processes of science that meaning is attached to otherwise lifeless data," he said. "Science transforms the static into the dynamic . . . and adds the delightful intellectual savor of understanding. The joy of understanding is both the closest rival to the joy of service and its most effective partner."

Emphasis on "Basics"

Teaching of "basics" with interrelating of various subjects was also emphasized by Dr. Oliver Cope, associate professor of surgery at Harvard Medical School.

Three separate factors today "cry for revision of our present approach to medical education: the huge body of knowledge useful to medicine, the birth of a well-founded psychiatry, and the threatening hoard of obsolete modes of therapy," Dr. Cope said.

If the present line of curriculum extension should continue, it could reach the "astonishing length of 18 years" of training by 1970 he said. No concerted effort has been made "to discriminate between those facts essential to medical education and those less likely to stand the test of time."

Group teaching, he said, offers a ready solution. Teachers from two to four departments joining in lectures, seminars, and clinics automatically limits the areas and facts being taught, while free discussion between faculty members in front of the students "opens less worthwhile material to criticism."

At present there are too many departments, he said. For instance, physiology, pharmacology, and biochemistry are all teaching aspects of the same subject. It could be effective if they were joined as a division of physiological chemistry.

These methods could afford a prompt means of pruning the facts taught, of weaving psychiatry into other branches, and of ridding the curriculum of obsolete therapies, he concluded.

Graduate Programs in Universities

In the graduate field, one of the major changes has been the incorporation of the medical school within a university, according to Dr. E. Hugh Luckey, dean of Cornell University Medical College.

While this has resulted in some difficulties, the university's influence on research and teaching methods has greatly advanced the state of the nation's health, he said.

"The four years of medical school should constitute an experience that is the best possible preparation for all types of professional careers in medicine," he said. "This experience should prepare the physician for any kind of professional career; it should not be directed primarily toward training for any particular type of practice."

Since it is impossible for the medical student to learn all the things he will need to know in practice, medical school education "must necessarily be centered around the acquisition of a reasonable and balanced portion of the available knowledge" and must also develop "the ability to come to adequate conclusions from inadequate evidence," he said.

When graduate training is aimed toward general practice, it must meet certain principles, Dr. William Hildebrand, Menasha, Wis., former president of the American Academy of General Practice, said. Among them: 1. The first year should be a well-rounded rotating internship. 2. General residency should be a minimum of two years with an optional third for specialization. 3. Residency must be flexible with choice of service. 4. The first year of residency should cover all general fields but emphasize medicine, pediatrics, and psychiatry. 5. The second year should include experience to allow the generalist to handle average traumatic problems. 6. Obstetric training should insure that the physician can handle normal obstetrics and give him the ability to recognize and handle major emergencies and complications.

7. The third or elective year should be available for further clinical training in the particular field of choice. 8. Bedside instruction should be supplemented by conferences, seminars, audiovisual aids, laboratory facilities—both pathological and clinical, an adequate library, study of pathological tissues, and case records. 9. Outpatient or home service should be available for experience in managing ambulatory patients. 10. The director of the resident program should be selected with care and given full responsibility for planning and administering. 11. Faculty and clinical staff should be of unquestioned ability and experience. 12. General residents must not be considered inferior but should be given the same dignity and prestige as residents in any other field.

Experience

Physicians looking at graduate training for general practice from the standpoint of the various specialties agreed in general that this training cannot be expected to give the physician knowledge he can only get in practice. "We cannot teach experience," one speaker said.

Generally their remarks agreed with that made by Dr. Lawrence M. Randall, Mayo Clinic obstetrician, who said schools should give the physician "basic experience to enable him to evaluate the patient, so he has a broad perspective of the problems and is able to select treatment, some of which he may give but in addition be able to recognize treatment that others should administer."

In psychiatry, this means sufficient knowledge and background to make a differential diagnosis in view of the dual role of this field—personality function and

psychophysiology, according to Dr. M. Ralph Kaufman, Columbia University College of Physicians and Surgeons and chief of psychiatry at Mount Sinai Hospital.

He also suggested that psychiatric teaching staff members should spend most of their time with other members of the faculty rather than with students, since "psychiatry must be demonstrated by every teacher of basic science and every clinician . . . and in terms of patients seen on their own wards rather than those selected patients on psychiatric service."

Postgraduate Medical Education

Before postgraduate medical education can "become of age" a number of challenges must be met, Dr. William Sodeman of the University of Missouri School of Medicine, Columbia, said. Keynoting the session on this topic, Dr. Sodeman said that continuing education for the practicing physician has not yet reached the level of undergraduate and graduate training mainly because its problems and programs have not been clearly defined.

One of the major problems is the varied needs and interests of the practicing physician, he said. "In undergraduate and graduate education the student groups involved are fairly uniformly graded, and the programs are generally full time. In the postgraduate field these features, which lead to a relatively easily planned program, do not exist. Each man's problems, needs, opportunities, time, stimulus, background of experience, and training vary widely."

Dr. Victor Johnson, Vice-chairman of the Council and a physician at the Mayo Foundation for Education and Research, agreed that postgraduate education as a lifelong process must be equal in quality to undergraduate education. He noted that the Council has become more concerned with this problem since World War II and is beginning to offer suggestions and recommendations.

Examples of Postgraduate Education Programs

Several examples of postgraduate education through different techniques were given by speakers connected with such programs. One of these, the regional hospital–medical school program, offers the practicing physician an "unequalled 'do-it-yourself' potential," according to Dr. Harry A. Towsley, University of Michigan Medical School.

Dr. Towsley, who coordinates the Michigan postgraduate program, said the best place for a physician to continue his education is within his own hospital. This is true, however, "only as long as he maintains an open, inquiring, critical mind and a keen interest in the progress of the science of medicine."

Dr. Towsley said the major feature of the Michigan program is the cooperation of the practicing physician in the regional hospital training courses supervised by the medical school. Through teaching of undergraduate and graduate students, the physician himself has an opportunity for educational stimulation.

"This opportunity is greatly enhanced if his hospital is charged with the responsibility of providing a satisfactory training experience for interns or medical students, particularly if that obligation is discharged with pride in the product of its efforts," he said.

The Kansas program, described by Dr. Mahlon H. Delp of the University of Kansas School of Medicine, is the prototype of postgraduate education involving a medical school and a state society. The chief responsibility is in the university and its department of postgraduate medical education of the school of medicine. The university's recognition of this department's prime responsibility was a major step, but most important has been the cooperation and association of the state medical society—"the program's student body," he said.

Constant participation of basic science teachers along with clinical teachers in teams both on circuit and short-course programs has done much to eliminate "the schism between basic scientists and practicing physicians," he noted.

Outlining the experiment at the Hunterdon Medical Center, Flemington, N. J., was Dr. Edmund Pellegrino, its medical director. The hospital was planned to provide "a broad spectrum of medical services to a rural community at a level of quality equivalent to that practiced in the university medical center," he said.

Its most important aspect—both for the patient and for the education of the practicing physician—has been the close cooperative effort of general practitioners and specialists. Especially valuable is the avoidance of isolating the general practitioner from the medical community and bringing him into close daily contact with a staff of full-time specialists, he said.

Federation of Medical Boards

Prior to the opening of the congress itself, the Federation of State Medical Boards of the United States held its first Examination Institute, covering obstetrics and gynecology.

The purpose of the institute, which is expected to be held periodically, covering a different field each time, is to bring licensing board members together to compare notes and to work toward equalizing licensure among the states.

"Our schools are so well standardized that any graduate of an American or Canadian medical school is sufficiently educated to practice medicine in any state," according to Dr. Joseph J. Combs, Raleigh, N. C., president of the federation.

He said the federation now is concerned with the question of "fitness"—of a man's ability to apply the knowledge gained in medical training.

Many state licensing boards already are directing their examinations toward fitness rather than concentrating on factual education, but the federation hopes to make this more uniform, so that "any man licensed in one state can be licensed in any other."

At its final session the federation installed as president Dr. C. J. Glaspel, Grafton, N. D., to succeed Dr. Combs. Officers elected were Dr. W. D. Richards, Pittsburgh, president-elect; Dr. E. H. Lawson, New Orleans, vice-president; Dr. H. E. Jervey Jr., Columbia, S. C., and Dr. W. C. Foster, Portland, Ore., executive committee members; and Dr. Walter Bierring, Des Moines, Iowa, reelected secretary-treasurer.

COUNCIL ON MEDICAL EDUCATION AND HOSPITALS

POSTGRADUATE COURSES

The following information regarding courses for the practicing physician that were not listed previously in THE JOURNAL has been reported to the Council:

A course for Massachusetts school physicians, regarding **the public health aspects of tuberculosis in children and after-care as well as encephalitis and poliomyelitis in children,** will be presented during four Wednesday afternoons beginning March 13, 1957, at state institutions in North Wilmington, Wrentham, Waltham, and Boston. Sessions are sponsored by the School Physicians Association and the Department of Public Health. Educational methods will consist of lectures, patient demonstrations, live clinics, and ward rounds for at least two hours on each of the four afternoons. There is no fee. The four sessions are independent of each other in place, faculty, and program content so that missing of initial sessions by a physician would not preclude attendance at later ones. For further information, write to Sidney S. Listernick, M.D., P. O. Box 109, Everett 49, Mass.

Fractures and Other Trauma, a three-and-one-half-day course for full-time specialists will be presented April 10-13, 1957, at the John B. Murphy Auditorium, 40 E. Erie St., Chicago. The faculty of 53 doctors for this course, under the sponsorship of the American College of Surgeons, will be drawn from the faculties of four medical schools in Chicago. Educational methods will include lectures, patient demonstrations, question-and answer periods, and symposiums. The fee is $50, although residents and interns may register for $5 upon presentation of a letter from the chief of service. For further information, write to Dr. John J. Fahey, 1791 Howard St., Chicago 26.

A three-day continuous course on **gastroenterology** will be presented May 13-15 at the University of Colorado Medical Center, 4200 E. Ninth Ave., Denver, in cooperation with the American Gastroenterological Association. A broad and intensive review of present-day concepts and pertinent recent developments will be presented by 28 nationally known guest physicians who have authoritative knowledge of their respective fields. The 20 hours of instruction will include lectures, panel discussions, and open question periods, at a fee of $30. The course is open to physicians in general practice as well as to those in full-time specialty practice. For further information, write to the Office of Postgraduate Medical Education, University of Colorado Medical Center, 4200 E. Ninth Ave., Denver 20.

Courses Sponsored by the American College of Physicians

A course in **gastroenterology** will be presented at the Boston University School of Medicine under the sponsorship of the American College of Physicians, April 1-5, 1957. This 5-day 40-hour course on the latest advances in this field will be presented in lectures, panels, and open question periods. The fee is $30 for American College of Physicians members and $60 for nonmembers. All of these courses are open only to physicians in full-time specialty practice. For further information on this and on the other courses sponsored by the College, write to the organization at 4200 Pine St., Philadelphia 4.

A course on the **latest advances in internal medicine** will be presented at the University of Chicago School of Medicine under the sponsorship of the American College of Physicians, May 13-17, 1957. This 5-day 40-hour course will be presented as seminars and lectures as well as open question periods. The fee is $30 for American College of Physicians members and $60 for nonmembers.

A course on the **latest advances in internal medicine** will be presented at the New York University Post-Graduate School of Medicine under the sponsorship of the American College of Physicians, May 27-31, 1957. This 5-day 40-hour course will use lecture, panel, and open-question-period methods of education. The fee is $30 for members and $60 for nonmembers.

A course in **ballistocardiography** will be presented at the University of Pennsylvania School of Medicine under the sponsorship of the American College of Physicians, June 10-12, 1957. This 3-day 20-hour course will be presented as lecture and open question periods. The fee will be $30 for members and $60 for nonmembers.

A course on the **latest advances in internal medicine** will be presented at the Louisiana State University School of Medicine, Shreveport, La., under the sponsorship of the American College of Physicians, May 20-24, 1957. This 5-day 40-hour course will embody live clinics, ward rounds, lectures, and open question periods. The fee will be $30 for members and $60 for nonmembers.

A course in the **early detection and prevention of disease** will be presented at the University of Pennsylvania School of Medicine under the sponsorship of the American College of Physicians, May 20-24, 1957. This 5-day 40-hour entirely lecture and panel course in the auditorium of the school will have open question periods.

Course Sponsored by Trudeau Foundation

The Trudeau Foundation, Saranac Lake, N. Y., will present a course on **pulmonary tuberculosis and certain phases of other chronic chest diseases, including those of occupational origin,** for physicians in full-time specialty practice of chest disease, June 3-21, 1957. This 15-day 100-hour course in the auditorium of the foundation, as well as at the Ray Brook State Tuberculosis Hospital in Ray Brook, the Veterans Administration Hospital in Sunmount, the Variety Clubs—Will Rogers Hospital in Saranac Lake, and the Sanatorium Gabriels in Gabriels, will include laboratory work, patient demonstrations, live clinics, and surgery, as well as seminars, lectures, panels, open question periods, and the use of visual aids. The fee will be $100. Contact the Trudeau Foundation, Box 500, Saranac Lake, N. Y.

MEDICINE AND THE LAW

This is the eighth in a series of articles dealing with medical professional liability. An editorial (page 360) and a chronological résumé (page 364) appeared in THE JOURNAL, *Feb. 2. One of the preceding articles in this series has been published each week in* THE JOURNAL *beginning Feb. 9, 1957.*—ED.

PROFESSIONAL LIABILITY CLAIMS PREVENTION

Howard Hassard, San Francisco

Analysed in retrospect to trace causes, nearly all professional liability claims are found to have been preventable. But when we compare these real causes of claims and suits with the kinds of professional liability claims prevention we often hear recommended, the treatment appears to be directed at symptoms rather than at the disease.

Professional liability claims will be neither prevented nor reduced in size or frequency by "educating" attorneys, by reducing the amount of insurance physicians carry, by attempts to cover up in cases in which the doctor is legally liable for injuries suffered by the patient, by seeking special legislation that would in effect place the physician above the law, by circularizing lists of patients who have sued doctors, or by any other action that does not strike at the real causes of claims and suits. Any program that is unrealistic, that is unobjective in its approach or that is retaliatory against the public or any of its segments might just as well not be undertaken; it simply will not work. Worse, it will probably backfire and aggravate the problem.

The real causes of professional liability claims are (1) misunderstanding by the physician of his legal duties to the patient; (2) actual malpractice; and (3) human relations problems. Claims prevention, to be successful, must center upon the treatment of these causes.

Definitions

The first point to consider is the word "prevention." Actually, medical malpractice cannot be completely prevented, at least until the human being incapable of making a mistake is invented. Since medical malpractice is the law of negligence applied to professional services, 100% prevention of professional liability claims would necessitate a profession that never ever is negligent either by omission or commission. Of course, at this writing such prevention is not possible, in physicians or anyone else.

What is really meant by the term "claims prevention" is a safety program, an understanding of the methods of conducting a medical practice that, first, will minimize professional error, and, second, will reduce the likelihood of an angry patient if the results of treatment are less than could be desired by the patient or are due to error. Industrial accidents have not been eliminated, but a diligent industrial safety program has reduced their frequency. Fires have not been prevented, but a diligent safety program has reduced the incidence of destructive fires.

"Malpractice" is just another way of saying failure of a physician to use average skill, care, and precaution in rendering his professional services to a patient. The law of malpractice is a part of the over-all law governing human relations, which requires that all of us use reasonable care to avoid injuring others. It is a special part of the general law of negligence, applicable to those who undertake to treat the sick and injured.

"Malpractice" is an unfortunate word, because it so commonly implies that its victim is a bad doctor. This is not so. The best trained and most conscientious physician may err in a particular case, or his legal agent (nurse, technician, assistant) may err, and the law may consider such error to be his negligence as to that particular case. Legally, no generalization is implied or warranted. Further, "malpractice" as a rule of law is not limited to physicians; it applies to all professional services furnished on a contract basis. It is applicable to attorneys, dentists, engineers, construction contractors, architects, and barbers, to name a few. Under a different label, that of "products liability," it applies to manufacturers.

A more accurate term for physicians' legal responsibility would be "professional tort liability." However, "malpractice" is imbedded in both legal and medical literature and habit of thought, so its use no doubt will continue.

The law requires physicians (*a*) to possess at least the average skill and knowledge possessed by other physicians in the same community and in the same field of practice and (*b*) to apply their skill and knowledge carefully and prudently.

These requirements are imposed by law at the very instant the physician-patient relationship is created, and these legal duties are independent of any other factor, including compensation.

The Causes of Claims

The first step in a safety or prevention program is a realistic appraisal of the reasons why some patients resort to law for redress of grievances, actual or

General Counsel, California Medical Association.

fancied. To determine these causes, inquiry must be made into all facets of malpractice claims; an objective and systematic study is necessary.

Efforts along this line have been undertaken in New York and California; the results are not necessarily conclusive, but I mention them as illustrative of the type of inquiry that must be undertaken to get at causes. Most cases, both warranted and unwarranted, are found to stem from human relations problems. There is a lack of frankness or human understanding by the physician; people are not inanimate objects, nor can they be assumed to be stupid. The physician must be kind, courteous, sympathetic, and frank if he is to avoid sowing the seeds of doubt, resentment, distrust, and anger. Many claims originate from malicious or thoughtless and uninformed criticisms by a physician to a patient regarding the care received from another doctor. Another substantial cause is hasty sending of a bill or resort by physicians to collection agencies, particularly without adequate prior sympathetic effort to ascertain the patient's state of mind with respect to the services furnished and the results obtained. Frequently, friends or relatives who are physicians, nurses, pharmacists, or lawyers stimulate dissatisfaction and urge the dissatisfied patient to sue.

Another group of professional cases results from the physician's lack of understanding of his legal duties to the patient. In this general category are failures to obtain proper consents, failure to put the uncooperative patient on notice that his refusal to follow advice will result in harm to him, and failure to arrange for a substitute when unable to attend in person.

A final group of claims and suits results from actual medical malpractice. This group is relatively small. In northern California in the past 10 years approximately 10% of all closed malpractice claims have involved out of court settlements or court-awarded damages. This means that 90% of all claims were not sufficiently meritorious to warrant compensation to the patient. Granted that some were borderline, with honest differences of opinion that could be settled only by litigation, nevertheless a large proportion could have been eliminated if a proper understanding between physician and patient had existed. But actual malpractice does occur.

Prevention

What, then, may be done to reduce the frequency of claims?

The most important element in a prevention program is the intensive education of each and every physician with respect to (*a*) his legal duties (i. e. what is medical malpractice), (*b*) his responsibilities to the public, (*c*) the real underlying causes for patient dissatisfaction, (*d*) the do's and don'ts to avoid being sued, and (*e*) the inter-relation of his responsibilities with those of others (i. e. nurse, hospital, consultant, laboratory, etc.).

It is essential that practicing physicians be at least reasonably well informed on the basic legal rules that govern their activities. To too many physicians the law is a mystery, paralleled only by the mystery of medicine to lawyers. Two serious consequences, malpracticewise, of inadequate legal knowledge by physicians are: (*a*) Nonrecognition by a physician of the fact that a particular course of action is contrary to law until it is too late; and (*b*) Erroneous judgment of the acts of another physician because of application of a nonlegal standard to the other doctor's acts (this frequently triggers a malpractice claim or suit).

An explanation of the basic rules of medical malpractice and their everyday application must be available to every practicing physician, and if necessary must be emphasized over and over again until the lesson is learned. An elementary exposition of the law of malpractice in plain English is an integral part of any worthwhile educational program. It should start in the medical schools. There should be a brief course taught in a realistic and elementary fashion in every medical school. The subject should be repeated to hospital residents by means of short lectures during the period of residency; the subject should again be repeated to all applicants for admission to county medical society membership. Sufficient time for at least an elementary discussion of malpractice should be allotted in each of these forums. In addition, seminars on medical malpractice should be conducted periodically by each county medical society.

Written material such as textbooks and pamphlets have their place, but they cannot and do not convey a basic understanding; old-fashioned classroom teaching has no substitute.

Basic instruction in "malpractice prevention" should stress, at the very least, these major points:

1. Do not undertake any procedure unless you are fully qualified.

2. When in doubt—consult.

3. Shun experimentation or the use of drugs or procedures with which you are not fully familiar—if the patient's welfare requires a calculated risk, explain it in advance.

4. If an accident happens (e. g. foreign body lost during surgery, wrong bottle taken from shelf, etc.), explain fully and carefully what occurred—do not conceal, do not say "I made a mistake", do not blame someone else (nurse, etc.)—but, do explain the facts.

5. At all times maintain current, accurate and legible records—never alter, or destroy, a record after a complaint is registered.

6. Don't take on more work than you can reasonably handle—remember, fatigue causes accidents everywhere, not just on highways.

7. If you and a patient are not compatible, sever relations and help the patient to another physician —you will both be happier.

8. Discuss your fees frankly and in advance. Realize that people have many obligations other than the cost of medical care.

9. Keep abreast of medicine. Physicians and lawyers alike never complete their schooling. Remember, we asked for it.

A worthwhile program of instruction in the legal aspects of medical malpractice must also stress: (*a*) that we live under a government of laws, not men, and that therefore everyone, no matter what his status, is subject to the law; (*b*) that medical malpractice, like any other human error, does at times occur, and that efforts to suppress redress for such occurrences intensify the over-all malpractice problem rather than alleviate it; (*c*) that an understanding of the basic legal rules governing the practice of medicine will in and of itself tend to reduce the incidence of malpractice (human beings fear that which is unknown and are only able to cope with situations when they possess an understanding); and (*d*) that complaints against or attacks upon the legal profession per se, or the public in general, will not achieve any reduction in the incidence of malpractice claims, but on the contrary will have an inevitable tendency to increase their frequency and intensity.

Physicians at times are prone to believe that if only it were possible to muzzle the legal profession all malpractice suits would end. This approach overlooks the fact that an attorney cannot threaten or commence litigation unless he has a client who is ready, willing, and able to sue. Overtures to the legal profession that in effect ask that profession to refrain from practicing law within a particular field necessarily create resentment. It is the duty of a lawyer when retained to utilize all lawful means to advance his client's cause; if he does less than that he is not practicing sound ethical law. He may even be guilty of legal malpractice. Lawyers bitterly resent any effort, no matter how well intended, to interfere with their freedom of action. Likewise, to complain to the public solely because physicians are subject to suit for real or fancied mistakes can only create resentment and intensify the tendency of dissatisfied patients to sue doctors.

Hospital Controls

In addition to education of individual physicians with respect to the basic rules of medical malpractice and the pitfalls to avoid in the daily practice of medicine, there is extremely important group action that must be taken by medical organizations if the incidence of unwarranted and indefensible claims and suits is to be held to the irreducible minimum. Perhaps the most important in this area is the maintenance of proper minimum standards in hospitals to minimize actual malpractice. The majority of serious claims and suits arises out of acts or omissions occurring while the patient is hospitalized. This is natural, in view of the fact that most serious procedures are performed in rather than out of the hospital.

If the medical staff fails to carry out its duties of self-government, if physicians are permitted without checks or balances to perform any procedure that suits the individual's fancy, it is inevitable that a few staff members will undertake treatment, surgical or otherwise, beyond their training or capabilities. This is an open invitation to a subsequent malpractice claim or suit. It is difficult for all of us objectively to evaluate ourselves. It is not proper to criticize the physician who is left utterly alone to practice as he pleases and who goes beyond his depth. The absence of controls by the medical staff of a hospital is no favor to the individual physician practicing therein. Experience proves that the incidence of malpractice claims and suits is in inverse ratio to the professional controls maintained by the hospital medical staff.

Claims Handling

Another area of group action that has been undertaken somewhat spottily and in differing fashions in various portions of the United States is the utilization of medical committees to evaluate and advise with respect to the medical merit of malpractice claims or suits that arise in the community. Such committees functioning improperly can be harmful, but if they act in the public interest they can be a long-range force for the elimination of a large percentage of claims or suits that are lacking in merit. A medical committee that whitewashes each case is best disbanded forthwith. One that does not contain an adequate cross section of the various specialties and fields of medicine is not equipped to do a good job, because most malpractice claims involve multiple fields. A committee that endeavors to act as a "kangaroo court" and to interfere with the right of a patient to present his case to an impartial judge and jury, is likewise valueless and potentially injurious to the profession. Such activity can quickly build up deep public resentment.

On the other hand, a medical committee that includes a cross section of medical practice, that is willing to study intensely each case in an objective fashion, that is willing to recognize and proclaim medical malpractice when it exists, but is equally willing to defend on the witness stand a colleague who is unjustly sued can, in the course of time, achieve a public stature that will cause lawyers and the general public alike to respect it and to look to it for advice and information. With the aid of such committees the "nuisance" suit can be effectively defended and discouraged. The meritorious suit can be detected and compensation paid without the need for lengthy and expensive litigation.

Summary

There is no easy short cut to elimination of the malpractice menace. The incidence of claims may, however, be sharply reduced by an intelligent and determined program of education of each physician to his legal duties and to the irritants that create a suit-minded patient. Patients frequently forgive the accidents of medicine when they are fully informed and fairly treated. A patient who knows that his doctor is really interested in his welfare and is trying hard rarely sues.

Group action on a medical community basis can be an effective means to evaluate those claims that do arise, and properly defend all that are unwarranted.

MEDICAL NEWS

CALIFORNIA

Meeting of Allergists and Pediatricians.—The California Society of Allergy annual meeting will be held in conjunction with the annual session of the California Medical Association at the Ambassador Hotel, Los Angeles, April 28-29. The program includes a joint meeting with the section of pediatrics, at which a panel discussion, "Pediatrics and Adult Allergy," will be moderated by Dr. Ben C. Eisenberg, Huntington Park, president of the society. Among other speakers will be Dr. Knud Wilken-Jensen, Copenhagen, Denmark, whose topic is "The Diagnosis and Treatment of Allergic Children." For information write Dr. William J. Kerr Jr., Secretary, 711 D Street, San Rafael, Calif.

CONNECTICUT

Waterbury Centennial.—The Waterbury Medical Association began a series of meetings designed to commemorate its centennial year with a dinner on the 100th anniversary of its founding, Feb. 5, 1857. The program consisted of a history of the society given by Dr. Edward H. Kirschbaum, Waterbury, and a centennial oration, "The Simplicity to Wonder," by John C. Krantz Jr., Ph.D., professor of pharmacology, University of Maryland School of Medicine, Baltimore. Future events will consist of a lecture to the public on heart disease by Dr. Paul Dudley White, Massachusetts General Hospital, Boston, April 24, an exhibit on 100 years in medicine in Waterbury open to the public to be held in September, and a lecture to the medical society on 100 years of medicine in Connecticut by Mr. Fred Kilgour, librarian of the Yale Medical School.

ILLINOIS

Chicago

Hospital News.—Drs. Fred O. Priest and William J. Baker, staff members of the recently merged Presbyterian-St. Luke's Hospital, have been named as heads of the medical division for the hospital's $18,500,000 development program.

Society News.—The Chicago Society of Physical Medicine and Rehabilitation will hold its regular meeting at 8 p. m., April 15, at Stritch School of Medicine, 706 S. Wolcott Ave. William G. Kubicek, Ph.D., professor of physical medicine and rehabilitation, University of Minnesota Medical School, Minneapolis, will speak on "Cardiac Output and Metabolic Demand During Physical Medicine Treatment."

IOWA

Pediatric Meeting in Des Moines.—The Raymond Blank Hospital Association will hold its first annual meeting at the Raymond Blank Memorial Hospital, Des Moines, April 27-28, where the program will be given by those who have completed residency training in pediatrics at this hospital. Among others, Dr. John A. Anderson, professor of pediatrics, University of Minnesota Medical School, Minneapolis, will discuss "Blood Ammonia Levels in Liver Disease in Children," and Dr. Lawson Wilkins, professor of endocrinology, Johns Hopkins University School of Medicine, Baltimore, will discuss "Gonadal Dysgenesis and Hermaphrodism." The registration fee is $15. A banquet will be held at the Hotel Savery, Des Moines in the evening ($4.50 a plate). The chairman of this association is Dr. Harley C. Sullivan, 112 Medical Arts Building, Wichita Falls, Texas, and the secretary, Dr. Charlotte Fisk, 3200 University Ave., Des Moines.

Society Meets in Des Moines.—The annual meeting of the Iowa State Medical Society will be held April 28-May 1, at the Veterans Memorial Auditorium, Des Moines. Scientific exhibits, a banquet, a golf tournament and ladies' program are planned. A special section meeting on medical economics is featured. The following are among the speakers and papers to be presented:

The Care of the Patient with Anxiety in General Practice, Edward G. Billings, Denver.
Endocrine Problems in Children, Lawson Wilkins, Baltimore.
Thrombocytopenia—Its Causes and Treatment, William J. Harrington, St. Louis.
Emergency Treatment of Eye Injuries, Albert N. LeMoine Jr., Kansas City, Mo.
Carcinoma in Situ of the Cervix Uteri (The Arthur Erksine Memorial Lecture, Arthur T. Hertig, Boston.
Management of Chronic Coronary Disease, Robert L. Grissom, Omaha.

KENTUCKY

General Practice Assembly.—The Kentucky Academy of General Practice will hold its sixth annual scientific assembly at the Brown Hotel, Louisville, April 24-26. Two round-table discussions, "The Acute Abdomen" and "Office Gynecology," are scheduled. Speakers and topics in the program include:

Allergy in the Connective Tissue Diseases, Dr. Fay B. Murphey Jr., Chattanooga, Tenn.
Management of Angina Pectoris, Dr. A. Carlton Ernestene, Cleveland.
Emergencies in the Newborn, Dr. John L. Reichert, Chicago.

The annual banquet will be held April 25, 6:30 p. m.

MASSACHUSETTS

Phi Delta Epsilon Lecture.—The Alpha Theta chapter of the Phi Delta Epsilon Fraternity at Tufts College Medical School will hold its 10th annual lectureship April 10, 8 p. m., at the Sherman Auditorium, Beth Israel Hospital, Boston. The guest speaker will be Dr. Charles P. Bailey, of Philadelphia, who will discuss "Surgical Correction of Coronary Arteriosclerosis."

Tumor Clinic Conference.—A tumor clinic at the Massachusetts Memorial Hospitals, Boston, is held in conjunction with the thoracic clinic on Friday morn-

Physicians are invited to send to this department items of news of general interest, for example, those relating to society activities, new hospitals, education, and public health. Programs should be received at least three weeks before the date of meeting.

ings and runs an active consultation service as well as a tumor registry. At 11:15 a. m. each Friday a conference is held for discussion of tumor problems. This is a free consultation service for private and ward patients inside and out of the hospital. It is attended by surgeons, medical men, radiologists, pathologists, and others. All interested doctors are invited to attend and to present problems.

Waterhouse Medical History Meeting.—The Benjamin Waterhouse Medical History Society will meet at the Massachusetts Memorial Hospital, Boston, April 23. Dr. Edward D. Churchill, John Homans Professor of Surgery, Harvard Medical School, Boston, will speak on "Notes on the History of Boston Surgery." Cocktails and dinner will be served at 6 p. m. For dinner reservations call KE 6-8600, Ext. 360, no later than April 22. All interested persons are invited. For information write: Dr. John J. Byrne, Secretary, 818 Harrison Ave., Boston 18.

Surgical Seminar.—The Third (Boston University) Surgical Service annual seminar will be held April 17, at the Dowling Amphitheatre, Boston City Hospital. The topic will be "Surgery of the Ductless Glands," with Dr. John J. Byrne as chairman. Topics and speakers include:

Diagnosis and Treatment of Testis Tumors, Wyland F. Leadbetter, Massachusetts General Hospital, Boston.
Tumors of the Adrenal Glands, John W. Baker, Pennsylvania Hospital, Philadelphia.
Ulcerogenic Tumors of the Pancreas, Robert M. Zollinger, Ohio State University Hospital, Columbus, Ohio.
Hyperparathyroidism, B. Marden Black, Mayo Clinic, Rochester, Minn.

For information write Dr. John J. Byrne, 818 Harrison Ave., Boston 18.

Grant for Study on Metabolism.—A grant of $48,000 for a three-year program devoted to the strengthening of teaching and research in the field of carbohydrate metabolism and diabetes has been made to the Harvard Medical School, Boston, by the Adler Foundation, Inc. The program will be directed by Dr. Albert Renold, director of the laboratory and metabolism ward of the department of medicine, Peter Bent Brigham Hospital, Boston. Much of the research program will be effected through the research laboratories of Diabetes Foundation, Inc., a nonprofit research and educational organization, directed by Dr. Elliott P. Joslin, clinical professor of medicine, emeritus, Harvard Medical School, Boston. The Adler Foundation, Inc., founded by Mr. and Mrs. Morton M. Adler, of Rye, N. Y., is dedicated to the stimulation of greater emphasis on the problems of diabetes mellitus by university teaching groups.

MICHIGAN

Annual Cancer Day at Flint.—The 12th annual cancer day sponsored by the Genesee County Medical Society will be held April 17 at Hurley Hospital, Flint. Among the speakers will be Drs. Grantley W. Taylor, department of surgery, Harvard Medical School, Boston; Sidney Farber, director, Children's Cancer Research Foundation, Boston; Perry B. Hudson, department of urology, Columbia University College of Physicians and Surgeons, New York City; and Warren H. Cole, professor of surgery, University of Illinois College of Medicine, Chicago.

MINNESOTA

Dr. Bittner Receives Award.—John J. Bittner, Ph.D., director of cancer biology, department of pathology, University of Minnesota Medical School, Minneapolis, received the Bertner Foundation Award March 8 at the University of Texas M. D. Anderson Hospital and Tumor Institute for his research on factors involved in the origin of mammary cancer in mice. Dr. Bittner gave the Bertner Foundation Lecture at the 11th annual symposium on fundamental cancer research on "Studies on Mammary Cancer in Mice and Their Implications for the Human Problem." This award was established in honor of the late Dr. E. W. Bertner, first president of the Texas Medical Center at Houston, Texas, and first acting director of the University of Texas M. D. Anderson Hospital.

MISSOURI

Hospital Alumni Dinner.—The annual St. Louis City Hospital Alumni Association dinner will be held April 24 at the Le Chateau Restaurant, 10405 Clayton Road, St. Louis County. Officers of the association for 1957 are as follows: Drs. Joseph C. Peden Jr., president; William D. Hawker, vice-president; Lee A. Hall, treasurer; Drennan Bailey, secretary; Francis J. Catanzaro and Francis O. Trotter Jr., counselors.

MONTANA

Society News.—The American Diabetes Association recently announced the reappointment of Dr. John A. Layne, Great Falls, as its governor for the state of Montana.——The Mount Powell Medical Society has named Dr. Harold F. Hagan, Anaconda, president and has reelected Dr. A. C. Knight, Deer Lodge, as secretary-treasurer.——The Southeastern Montana Medical Society has elected Dr. W. H. Randall, Miles City, president; Dr. Richard E. Thompson, Glendive, vice-president; and Dr. Edwin L. Stickney, Broadus, secretary-treasurer (reelected).——Dr. Roger D. Mason, Conrad, has been named president of the Northcentral Montana Medical Society; Dr. Robert E. Sletten, Cut Bank, vice-president; and Dr. Rial W. Cummings, Shelby, secretary-treasurer.

NEW JERSEY

Memorial Fund.—A group representing former patients and friends of Dr. Murray David Berk, Pompton Lakes, are organizing the collection of a fund to establish a memorial to his memory in the Forest S. Chilton III Memorial Hospital in Pompton Plains. Contributions may be sent to the fund at Box 202, Pompton Lakes or to Garret C. Houman, 109 Wanaque Ave., Pompton Lake.

NEW YORK

Symposium on Physiological Thought.—The last of three symposiums on "The Historical Development of Physiological Thought in Medical Science" will be

offered by the State University of New York at its downstate medical center, Brooklyn, in the new basic science building, 450 Clarkson Ave., April 9-11. The subject will be "The Broad Application of Basic Concepts and the Unity of the Medical Sciences." Medical educators, physicians, members of the American Association of the History of Medicine, medical students, and the public are invited.

Personal.—Dr. Herbert R. Morgan, chairman, bacteriology department and director of the Rochester health bureau laboratories, University of Rochester School of Medicine and Dentistry, recently spent a month in Spain, where he aided the National School of Health in Madrid in setting up a tissue culture and virus laboratory for the Spanish government. Dr. John C. Duffy, Endicott, who joined the International Business Machines Corporation in June 1953 as plant physician, has been named coordinator of plant and laboratory medical services for IBM. In his new position he will be located at IBM world headquarters in New York City. Dr. Duffy is assistant treasurer and a member of the compensation committee of the Broome County Medical Society.——Dr. Frank R. Henne, for eight years assistant director of Harlem Valley State Hospital at Wingdale, has been named director of Newark State School, to succeed Dr. Dr. Isaac N. Wolfson, who has been appointed senior director of Letchworth Village. Dr. Henne is a graduate of the University of Toronto Faculty of Medicine.

New York City

Schoenbach Memorial Lecture.—The fifth annual Emanuel B. Schoenbach Memorial Lecture will be delivered at Maimonides Hospital of Brooklyn April 25 at 4:30 p. m. by Dr. William Dameshek, professor of medicine, Tufts College Medical School, Boston. His subject will be "Polycythemia and Related States."

Harvey Society Lecture.—The eighth Harvey lecture in the present series will be delivered April 11 at the New York Academy of Medicine, 103rd Street and Fifth Avenue, by David E. Green, Ph.D., professor of enzyme chemistry, institute for enzyme research, University of Wisconsin, Madison. The topic will be "Studies on Organized Enzyme Systems."

Tumor Clinic Conference.—Harlem Hospital announces a tumor clinic conference to be held April 17 in the Women's Pavilion. Guest speaker will be Dr. Gordon P. McNeer, associate attending surgeon, gastric and mixed tumor services, Memorial Center for Cancer and Allied Diseases, New York City, whose topic will be "Complete End Result Study of Gastric Cancer."

Dr. Eagle to Give Herter Lecture.—Dr. Harry Eagle will deliver the Christian A. Herter lecture of the New York University College of Medicine at 4 p. m., April 10, in the amphitheatre of the Bellevue Psychiatric Hospital, 30th Street near First Avenue. Dr. Eagle, who is chief of the section on experimental therapeutics of the National Institute of Allergy and Infectious Diseases, National Institutes of Health, will speak on "The Metabolism of Amino Acids in Tissue Culture."

Dr. Popper Comes to New York.—Dr. Hans Popper, for many years director of the department of pathology, Cook County Hospital, Chicago, scientific director of the Hektoen Institute for Medical Research of Cook County Hospital, and professor of pathology, Northwestern University Medical School, Chicago, has been appointed full-time director of the department of pathology at The Mount Sinai Hospital, New York City, and professor of pathology, Columbia University College of Physicians and Surgeons. Dr. Popper succeeds Dr. Paul Klemperer.

NORTH CAROLINA

Personal.—Col. Hans Lowenback, professor of psychiatry, Duke University School of Medicine, Durham, has been appointed commanding officer of 382nd Station Hospital, U. S. Army Reserve in Durham.

Nalle Clinic Foundation Lecture.—The eighth annual Nalle Clinic Foundation Lecture will be presented April 23 at the Hotel Charlotte, 8 p. m. The program will be devoted to orthopedic surgery, and the speaker will be Dr. S. Benjamin Fowler, Nashville, Tenn., whose topic will be "The Treatment of Tendon Injuries."

Memorial Lectureship.—An annual lecture, to be called the Adam T. Thorp III-Alpha Omega Alpha Lecture, is being organized by the Gamma chapter of AOA of the University of North Carolina School of Medicine, Chapel Hill, as a memorial to Adam T. "Skeets" Thorp III, of Rocky Mount, who was killed in an automobile acident last summer at the age of 7. Dr. Adam T. Thorp II, Skeet's father, was elected in his junior year to membership in the AOA, an honorary medical scholastic society and in his senior year served as secretary of the chapter. Dr. Thorp is now serving his internship in the Naval Hospital at Bethesda, Md. The first of the series of memorial lectures will be given at Chapel Hill May 15 by Dr. Robert E. Olson, of the University of Pittsburgh School of Medicine, Pittsburgh. The interest from the contributions will go toward paying the expense of the guest lecturer, and if the interest exceeds that needed for the lecture a memorial scholarship will be offered to deserving medical students. Contributions may be sent to Adam T. Thorp III Memorial Fund, N. C. Medical Foundation, Inc., P. O. Box 957, Chapel Hill.

Cancer Symposium.—The sixth annual cancer symposium, sponsored by the Forsyth County Medical Society in cooperation with the Forsyth Cancer Service will be held April 11 at the Hotel Robert E. Lee, Winston-Salem. Dr. Cushman D. Haagensen, associate professor of clinical surgery, Columbia University College of Physicians and Surgeons, New York City, will discuss "Recent Trends in the Therapy of Breast Carcinoma." A panel discussion on cancer of the uterus will be moderated by Dr. Robert A. Ross, professor of obstetrics and gynecology, University of North Carolina School of Medicine, Chapel Hill, with Dr. Frank R. Smith, associate professor of clinical obstetrics and gynecology, Cornell University Medical College, New

York City; Dr. George A. Hahn, assistant professor of obstetrics and gynecology, Jefferson Medical College of Philadelphia, Philadelphia; and Dr. Isadore Meschan, Winston-Salem, participating. Dr. Hahn will speak on "What is Cancer?" at the dinner meeting. For information write Dr. Richard T. Myers, Chairman, Forsyth County Cancer Committee, Wake Forest College, The Bowman Gray School of Medicine, Winston-Salem, N. C.

OHIO

Phi Delta Epsilon Fraternity.—The Upsilon chapter of the Phi Delta Epsilon Fraternity at the Western Reserve University will hold its 11th annual lectureship on April 26, at which time Dr. Homer W. Smith, professor of psysiology, New York University College of Medicine, New York, will discuss "De Urina."

Dr. Campbell to Give Freedman Lectures.—On April 13 and 14 Dr. John A. Campbell, chairman, department of radiology, Indiana University Medical Center, Indianapolis, will deliver the ninth annual Joseph and Samuel Freedman lectures in diagnostic radiology at the University of Cincinnati College of Medicine. Physicians desiring to attend are requested to write Dr. Benjamin Felson, X-Ray Department, Cincinnati General Hospital, Cincinnati, Ohio.

Society News.—A new program, designed to publicize the services of the Mahoning County Medical Society to the public, was outlined recently when representatives of the society and news mediums met at the Youngstown Club. The delegation of medical men was led by Dr. Stephen W. Ondash, Youngstown, president of the society, and Dr. Lewis S. Shensa, Youngstown, chairman, public relations committee. The objective of the meeting was to set up procedures for "an orderly distribution of the news."

Personal.—Dr. Robert Brandt, assistant professor, department of dermatology, University of Cincinnati College of Medicine, has spent several weeks in Lukachukai and other government installations surveying dermatologic problems among the Navajos. He is to continue these studies.——Dr. Russell B. Crawford, superintendent, Lakewood Hospital for 16 years, has been appointed assistant director in charge of medical relations for the Cleveland Hospital Service Association. He will direct a program to increase Blue Cross services to doctors and their patients. Dr. Crawford served as president of the Academy of Medicine of Cleveland in 1946 and as president of the Ohio Hospital Association in 1951.

Venereal Disease Seminar.—The Ohio Academy of General Practice announces a venereal disease seminar to be held at Hotel Biltmore, Dayton, April 17. The seminar has been planned to aid general physicians in the application of optimal methods of the diagnosis and management of patients with venereal disease, and it is offered to all Dayton and southwest Ohio physicians with postgraduate credit of 4½ hours, Category I, approved by the Ohio Academy of General Practice. The costs of instruction are being borne by the Ohio Department of Health and no tuition fee will be charged. Information may be obtained from Dr. Frederick H. Wentworth, Chief, Division of Communicable Diseases, State of Ohio Department of Health, 306 Ohio Departments Building, Columbus 15, Ohio.

OREGON

Muscular Dystrophy.—A clinic for the care and treatment of muscular dystrophy patients has been established at the University of Oregon Medical School in Portland with funds provided by the Portland chapter, Muscular Dystrophy Associations of America. The clinic will be under the direction of Dr. Roy L. Swank, head, department of neurology.

University News.—Dr. Charles N. Holman, professor of medicine, has been named associate dean of the University of Oregon Medical School, Portland. He will continue to serve as medical director and administrator of the school's hospitals and clinics and as administrator of the medical school hospital.——The University of Oregon Medical School, Portland, announces the appointment of Dr. Jack C. Edwards as assistant professor of surgery and anesthesiology and of Dr. Eugene W. Landreth as assistant professor of clinical pathology.

PENNSYLVANIA

Myasthenia Gravis Clinic.—The Myasthenia Gravis Clinic for Western Pennsylvania has been established at Mercy Hospital, Pittsburgh. Patients referred by their family physicians will be seen on alternate Thursdays from 2 to 5 p. m. at the clinic on the fourth floor of the hospital. Physicians intending to participate in the work of the clinic or wishing to refer patients, should contact Dr. Francis F. Foldes at Mercy Hospital.

Personal.—Dr. Lucy L. Edenborough, resident in oncology and pathology, Women's Medical College of Pennsylvania, has been awarded a $2,400 fellowship in the department of pathology by the American Cancer Society.——Dr. Frank W. Shaffer, formerly chief of the pediatric service at Montgomery Hospital, Norristown, has joined McNeil Laboratories, Inc., as assistant director of the division of clinical investigation.——Dr. Madison B. Brown, medical director, Hahnemann Medical College and Hospital, Philadelphia, was recently appointed director of administrative services for the American Hospital Association.

Meeting of Ophthalmologists and Otolaryngologists.—The 15th annual meeting of the Pennsylvania Academy of Opthalmology and Otolaryngology will be held May 23-25, at the Bedford Springs Hotel, Bedford. Dr. Chevalier L. Jackson, Philadelphia, president of the academy, will preside. The guest of honor will be Dr. Edwin N. Broyles, Baltimore. The meeting will consist of study groups and general sessions. The faculty for the study groups will be members of the societies. Noted opthalmologists and otolaryngologists have been invited to participate and two symposiums will be presented on "The Doctor and Insurance" and "The Practical Management of the Child with a Hearing Problem."

Philadelphia

Expand University Research Facilities.—The University of Pennsylvania has been awarded grants totaling $550,000 from the U. S. Public Health Service to assist in the construction of health research facilities. A grant of $400,000 was made toward the construction of a new research laboratory wing on the school of medicine at 36th Street and Hamilton Walk and for research facilities in two other new medical structures as one of the initial steps in a comprehensive, $3,200,000 long-range program for the extension and integration of research facilities. Half the total cost of this research construction is expected to be borne by the federal government over a three-year period. The new research laboratory wing on the school of medicine will be a multiple-story building that will cost about $2,500,000 and will contain laboratories for the basic science departments and their research programs. Research portions of the projected I. S. Ravdin Surgical Institute and of the new Henry Phipps Institute will also be constructed from these public health service grants.

Phipps Institute to Move.—The Henry W. Phipps Institute of the University of Pennsylvania has announced its intention to move from its downtown Philadelphia location at 7th and Lombard streets to a new building to be constructed at 43rd Street and Chester Avenue in West Philadelphia, adjoining the new West Philadelphia Health Center. It will operate under a cooperative arrangement between the University of Pennsylvania and the Philadelphia City Department of Health. Proceeds from the sale of the 7th and Lombard property and a recent gift to the university of $53,500 from the family of the late Henry W. Phipps will be used to construct the new facilities. A portion of the institute's new research laboratories will be constructed from a U. S. Public Health grant for $400,000. Functioning as a part of the University of Pennsylvania School of Medicine, the new instiute will undertake field studies of disease among large population groups. Tuberculosis studies will be continued, but emphasis will be placed on the chronic diseases that afflict the aging population. Specifically, studies will be conducted in heart disease, cancer, mental health, and rheumatism and arthritis.

Pittsburgh

Grant for Hospital Administration Project.—The Graduate School of Public Health, University of Pittsburgh, has received a grant of $180,000 from the U. S. Public Health Service to support a two-year project that will review problems in hospital administration and compile a model code of hospital law applicable to all states and a model constitution and by-laws to be used by administrators and governing boards as a guide to revising their present constitutions to conform to modern trends in hospital administration. The project also provides for a nontechnical handbook for the use of hospital administrators that will include such subjects as public health laws, privileged communications, maintenance of vital statistics, social security, creation of a course of instruction in hospital law to be used by graduate schools of hospital administration, and a complete guide for conducting institutes on hospital law. The school of public health will work in conjunction with the University of Pittsburgh School of Law and the American Hospital Association. An advisory committee of 13 doctors, lawyers, and hospital administrators has been selected. Dr. John R. McGibony, professor, medical and hospital administration, Pittsburgh Graduate School of Public Health, will be general coordinator, and John F. Horty, Harvard law graduate and incorporator at Lee Hospital, Johnstown, as director of study.

VIRGINIA

Personal.—Dr. James M. MacMillan, Richmond, has been appointed medical director of Reynolds Metals Company. He will be in charge of directing the medical plan of the company's headquarters in Richmond as well as of the other offices and plants of the company. For six years Dr. MacMillan has been on the executive committee of health and medical care of the Richmond area Community Council and is currently vice-chairman.

Dr. Kato Coming to Tangier.—Dr. Mikio Kato, Japanese physician who served as resident at Harlem Hospital, New York City, Mount Vernon (N. Y.) Hospital, and New Britain (Conn.) Hospital, has accepted the position of physician for Tangier, an isolated island off the Virginia coast. Dr. Kato returned to Japan last summer. He will assume his new duties as soon as quota limitations will permit his entry. He will succeed Dr. Charles F. Gladstone, who has announced his intention to retire after 38 years of service to Tangier. The Tangier town council and Golden Cross, a Virginia Methodist Conference affiliate that aids medical projects, have each pledged $6,000 toward a small clinic.

WEST VIRGINIA

Academy of Science Meeting.—The 32nd annual meeting of the West Virginia Academy of Science will be held at Potomac State College, Keyser, April 25-27. Brother G. Nicholas, vice-president, National Speleological Society in charge of science and research, will be the principal speaker. He is known for his scientific exploration of caves throughout the United States. The Junior Academy of Science Fair will be held cojointly with the annual meeting. An award of $25 is offered annually by the West Virginia State Medical Association to the member of the junior academy who submits the best paper on a medical subject during the school year.

WISCONSIN

The Phi Delta Epsilon Lectureship.—The Alpha Psi chapter of the Phi Delta Epsilon Fraternity at the University of Wisconsin, Madison, will hold its 11th annual Arthur S. Loevenhart lectureship April 16. The guest speaker will be Dr. F. Raymond Keating Jr., of the Mayo Clinic, Rochester, Minn., who will discuss "Primary Hyperparathyroidism, an Example of Changing Concepts in Clinical Disease."

WYOMING

Medical-Facility Fund Available.—Under the Medical Facilities Act, Wyoming has $300,000 in an unobligated fund to help finance the construction of diagnostic and treatment centers, chronic disease facilities, and nursing and convalescent homes. These funds must be allocated and under contract by June 30 of this year or they will be lost. Interested communities or individuals may contact Hale Laybourn, Director, Division of Hospital Facilities, Wyoming Department of Public Health, State Office Building, Cheyenne.

GENERAL

World Health Day, April 7.—Dr. Leroy E. Burney, surgeon general of the U. S. Public Health Service, has announced that the United States is joining with other nations in the observance of World Health Day, April 7. The day marks the anniversary of the coming into force of the constitution of the World Health Organization in 1948.

Plastic Surgeons Meet.—The Pacific Northwest Society of Plastic and Reconstructive Surgery announces its sixth annual meeting to be held at the University of Oregon Medical School, Portland, April 12-13. Information may be obtained from Dr. Willard D. Rowland, Secretary-Treasurer, 1130 S. W. Morrison St., Portland 5, Ore.

Tri-State Hospital Program.—The annual Tri-State Hospital program will be held at the Palmer House, Chicago. There will be two sessions: one, April 30, dealing with necessity of establishing inhalation therapy departments in hospitals, and the other, May 1, devoted to oxygen tent therapy. Information may be obtained from the American Association of Inhalation Therapists, 332 S. Michigan Ave., Chicago 4.

Announce Ophthalmology Fellowships.—Six additional fellowships for residents in ophthalmology, to begin July 1, have been announced by the Guild of Prescription Opticians of America, Inc. Each fellowship is for a total of $1,800, payable in monthly stipends over a three-year residency. Applications must be received by May 15. Information may be obtained by writing: Fellowships, Guild of Prescription Opticians of America, Inc., 110 East 23rd St., New York 10.

Psychiatric Research Conference.—The American Psychiatric Association Regional Research Conference will be held at the Oklahoma Medical Center, Oklahoma City, Okla., April 19-20. "Explorations in the Physiology of Emotions" is the subject of the program which includes panel discussions and papers. The fee is $5. Register by writing: Office of Postgraduate Instruction, University of Oklahoma School of Medicine, 800 N. E. 13th St., Oklahoma City 4, Okla.

Surgeons Meet at French Lick, Ind.—The Great Lakes divisional regional meeting and Indiana State chapter meeting of the International College of Surgeons will be held at the French Lick-Sheraton Hotel, French Lick, Ind., April 7-10. The speakers will be heads of departments at leading universities and medical schools in this country. Recent advances in medical and surgical therapy will be discussed. The hotel offers recreational facilities.

Announce Cardiovascular Research Grants.—The Los Angeles County Heart Association is accepting applications for research grants in the field of cardiovascular diseases for 1957-1958. Any investigator is eligible. Applications must be received by May 1. Grants will be given priority as follows: (1) research into the causes and means of prevention of heart disease; (2) studies of methods of diagnosis of individual cases of heart disease. Information may be obtained from the Los Angeles County Heart Association, 660 South Western Ave., Los Angeles 5.

Pacific Coast Oto-Ophthalmological Society.—The 41st annual meeting of the Pacific Coast Oto-Ophthalmological Society will be held April 7-11 at the Hotel del Coronado, Coronado, Calif. Short courses and scientific and motion picture sections in ophthalmology and otolaryngology, as well as papers, are scheduled. The registration fee is $50 for doctor and wife, $35 for single person, and will cover all regularly scheduled social events. The annual golf tournament will be held April 8 and the banquet at 6:30 p. m. April 9. Guest of honor will be Dr. David R. Higbee, senior surgeon, Mercy Hospital, San Diego, Calif.

Paraplegia Fellowships Announced.—The National Paraplegia Foundation announces the continuation of a limited number of fellowships for research in spinal cord disease and trauma and in the complications commonly associated with such disease or injury. A minimum stipend of $3,000 a year may be awarded to any candidate who has demonstrated a capacity for medical research and has outlined a program of meritorious study. Application forms may be obtained from the chairman of the advisory committee, Dr. L. W. Freeman, Indiana University School of Medicine, Bloomington-Indianapolis, Ind. Applications should be submitted to him not later than April 15.

Academy of Proctology Meets in New York.—The ninth annual convention of the International Academy of Proctology will be held at the Plaza, New York City, April 29-May 2. A seminar on practical techniques for office and hospital is planned. Emphasis will be on anal and rectal panel presentations and on newer treatment methods. Speakers from this country and abroad will present papers and motion picture demonstrations of their techniques. Entertainment includes a dinner and banquet. All physicians and their wives are invited. There is no fee for the teaching sessions. For information write Dr. Alfred J. Cantor, Secretary, International Academy of Proctology, 147-41 Sanford Ave., Flushing 55, L. I., N. Y.

International Prize Offered.—An international prize in memory of Pietro Caliceti, late professor of the clinic for otorhinolaryngology, University of Bologna, will be awarded to an Italian or foreign doctor in medicine and surgery who is considered to have published between Nov. 1, 1952, and Oct. 31, 1956, the best scientific work of undisputed value and recognized originality on oto-

rhinolaryngology. The prize consists of a gold medal, 1 million lira ($1,600), and a diploma attesting the awarding of the prize. The following documents should be sent to the Secretary of the University of Bologna in Italy before April 10: (1) a notarized application giving academic degrees of the competitor and (2) six copies of the scientific paper.

Dermatological Association Meets in Florida.—The 77th annual meeting of the American Dermatological Association will be held at the Belleview-Biltmore, Belleair, Fla., April 12-16. The presidential address, "The Skin's Reaction to Life's Stresses," will be given by Dr. Carroll S. Wright, Philadelphia. The 26 papers to be presented will be followed by open discussions. The president's party will be held at 6:30 p. m., April 12.

Each year the association offers awards for the best essays submitted for original work, not previously published, relative to dermatology or syphilology. Cash awards of $500, $400, $300, and $200 are presented. Competition is open to all scientists. For information write Dr. J. Lamar Callaway, Secretary, American Dermatological Association, Duke Hospital, Durham, N. C.

Essay Contest in Maxillofacial Surgery.—The American Society of Maxillofacial Surgeons announces an essay contest, open to any medical graduate, for papers based on clinical and experimental research in maxillofacial surgery. Papers (2,000–4,000 words), based on original work not previously published, must be submitted in triplicate before April 15. Certificates will be awarded for the two winning papers, which are to be read by the authors before the annual meeting of the American Society of Maxillofacial Surgeons at the Leamington Hotel, Minneapolis, May 12-15. Burroughs Wellcome & Co. (U. S. A.) Inc. has made $300 available for the expenses of the first winner, and $200 will be awarded for expenses to the author of paper judged second. Information may be obtained from the Secretary of the Society, Dr. John A. Drummond, 1414 Drummond St., Montreal 25, Quebec, Canada.

Fellowships in Forensic Medicine.—Western Reserve University, Cleveland, is now offering $5,000 fellowships in forensic medicine to qualified individuals with a minimum of three years' experience in general pathology. The appointment is for one year, and training is accredited by the American Board of Pathology. Practical work, carried on in the new Cuyahoga County Coroner's Laboratories on the campus of the university, includes about 1,200 medicolegal autopsies a year. Facilities are available for training in gross and microscopic pathology, forensic chemistry (toxicology), gross and microphotography, trace evidence, and forensic immunology. Fellows will have an opportunity to participate in "on the scene" investigation of violent, suspicious, and unexplained deaths. Instruction is provided in the administrative aspects of the modern medicolegal office and legal procedures affecting forensic medicine. An active research program is in progress in several phases of forensic medicine. Experience in courtroom work is an essential part of the program and special attention will be devoted to instruction in the presentation of medical evidence in civil and criminal proceedings, both in trial courts and before the grand jury and industrial commission. The Cuyahoga County Coroner's Office is an integral part of the Law-Medicine Center of Western Reserve University.

Industrial Health Conference in St. Louis.—The 12th National Industrial Health Conference will be held at Kiel Auditorium, St. Louis, April 20-26. This conference annually brings together five organizations: the Industrial Medical Association, the American Industrial Hygiene Association, the American Association of Industrial Nurses, the American Conference of Governmental Industrial Hygienists, and the American Association of Industrial Dentists. Specialists in the complexities of preventive medicine and hygiene in industry will present findings and developments relating to occupational diseases and injuries, mental health, rehabilitation and physical therapy, geriatrics and retirements, air pollution, toxicology, cancer as an industrial health problem, and engineering and analytical chemistry as related to industrial health. The C. O. Sappington Memorial Lecture will be given by Mr. Francis J. Curtis, vice-president, Monsanto Chemical Company; the Donald E. Cummings Memorial Lecture will be given by Helmuth H. Schrenk, Ph.D., research director, Industrial Hygiene Foundation, Mellon Institute, Pittsburgh. Exhibits of the latest developments in products and equipment will be displayed. Industrial physicians and surgeons, hygienists and members of affiliated professions are invited. For information write Dr. Edward C. Holmblad, Managing Director, Industrial Medical Association, 28 E. Jackson Blvd., Chicago 4.

Coordination of Hospital and Community Resources.—Under a $185,000 grant from the U. S. Public Health Service, the Council of Jewish Federations and Welfare Funds is undertaking a three-year study on measures being taken by committees to coordinate hospital and other community resources, toward better care of the chronically ill. Dr. Milton I. Roemer, formerly of the Saskatchewan (Canada) Department of Public Health, Regina, has been appointed director of the study. The plan is designed to study recent efforts to coordinate the services of the general hospital with the resources of other medical and related facilities in a dozen large cities throughout the United States. Theses facilities include chronic care institutions, homes for the aged, nursing homes, family service agencies, home medical care projects, and vocational rehabilitation agencies. The study will analyze actual programs in operation in various cities. These will include merger of two or more separate medical and welfare institutions, including a general hospital, into one medical-center administration; formal agreements between several independent institutions on joint use of medical staff and facilities; and informal agreements among institutions, involving various other types of cooperation. Dr. Roemer was formerly associated with the World Health Organization, under whose auspices he conducted studies in Central America and Ceylon and also served as chief of the social and occupational health section in Geneva. He had served previously as associate professor

of social and administrative medicine and was a commissioned officer in the Public Health Service for more than eight years. Dr. Roemer, author of many scientific books and papers, has given courses in social medicine and public health at West Virginia University School of Medicine, Morgantown, and the University of Saskatchewan in Saskatoon.

Society News.—The **American College of Physicians** (4200 Pine St., Philadelphia 4) announces the formation of a committee on cancer (1) to stimulate the internist in improving his knowledge in cancer diagnosis in the early state of disease, the selection of the proper definitive therapy (surgical, radiotherapeutic or medical), the best available therapy in disseminated disease, and palliative procedures in terminal disease; (2) to cooperate with other national organizations in the field of cancer for the dissemination of knowledge, improvement in service to the cancer patient, and collection of clinical data of value in furthering the knowledge on cancer; and (3) to encourage research in the field of cancer, especially in the fields of chemotherapy, hormone therapy, immune mechanisms, and growth phenomena.—At its annual meeting the **American Paraplegia Society** elected the following officers: Dr. A. Estin Comarr, Veterans Administration Hospital, Long Beach, Calif., president; Dr. Lewis W. Holladay, Veterans Administration Hospital, Richmond, Va., vice-president; Dr. B. A. Moeller Jr., Veterans Administration Hospital, Memphis, Tenn., secretary; and Dr. Stanley W. Pyzik, Veterans Administration Hospital, Hines, Ill., treasurer. Any physician working with paraplegics and interested in the American Paraplegia Society may contact the secretary, Dr. B. A. Moeller Jr., 3736 Briar Rose Rd., Memphis 11, Tenn.

FOREIGN

Clinical Psychopharmacology Symposium.—The International Symposium of clinical psychopharmacology will be held in Milan, May 9-11. The scientific program will be presented in five sections: "Biochemistry of Normal and Altered Cerebral Function," "Electrophysiologic Basis of Normal and Altered Cerebral Function," "Pharmacological Aspects of Central Acting Substances," "Behavioural Effects of Psychotropic Drugs in Animals," and "Clinical Experiences." Outstanding speakers from Italy, England, Canada, France, Switzerland, Yugoslavia, Hungary, Austria, and the United States will participate. Italian, French, English, and German will be the official languages used. Information may be obtained from the Secretariat: S. Garattini, Via A. del Sarto, 21, Milan, Italy. Accommodations may be obtained from Cook Travel Agency.

CORRECTION

Professor Philip R. Allison.—In the NEWS Feb. 16 Professor Philip R. Allison, Oxford University, Oxford, England, was referred to as "Sir Philip Allison" in citing the Judd Memorial Lecture given by him at the University of Minnesota Mayo Auditorium Feb. 21. Professor Allison has written, saying that he has no such title and is "plain Mister or Professor according to circumstances."

EXAMINATIONS AND LICENSURE

AMERICAN BOARD OF ANESTHESIOLOGY: *Part I.* Various locations, July 19. Final date for filing application was Jan. 19. *Oral.* Asheville, No. Car., Mar. 24-29. Sec., Dr. Curtiss B. Hickcox, 80 Seymour St., Hartford 15, Conn.

AMERICAN BOARD OF DERMATOLOGY: *Written.* Several cities, June 27. *Oral.* Baltimore, Oct. 11-13. Final date for filing application is April 1. Sec., Dr. Beatrice Maher Kesten, One Haven Ave., New York 32.

AMERICAN BOARD OF INTERNAL MEDICINE: *Written.* Oct. 21. *Oral.* Chicago, May 27-29; Los Angeles, Sept. 11-14. Final date for filing applications was Feb. 1. *Subspecialties. Gastroenterology.* Philadelphia, April 5-6. Final date for filing application is March 1. Exec. Sec., Dr. W. A. Werrell, 1 West Main St., Madison 3, Wis.

AMERICAN BOARD OF NEUROLOGICAL SURGERY: Examination given twice annually, in the spring and fall. In order to be eligible a candidate must have his application filed at least six months before the examination time. Sec., Dr. Leonard T. Furlow, Washington University School of Medicine, St. Louis 10.

AMERICAN BOARD OF OBSTETRICS AND GYNECOLOGY: *Part II.* Chicago, May 15-25. Final date for filing application was Feb. 1. Sec., Dr. Robert L. Faulkner, 2105 Adelbert Road, Cleveland 6, Ohio.

AMERICAN BOARD OF OPHTHALMOLOGY: *Oral.* New York, May 23-27; Chicago, Oct. 7-11. Sec., Dr. Merrill J. King, Box 236, Cape Cottage Branch, Portland 9, Maine.

AMERICAN BOARD OF OTOLARYNGOLOGY: Chicago, Oct. 7-11. Final date for filing application is April. Sec., Dr. Dean M. Lierle, University Hospitals, Iowa City.

AMERICAN BOARD OF ORTHOPAEDIC SURGERY: *Part I.* Washington, D. C., Los Angeles and St. Louis, Mo., April 18. *Part II.* New York City, Jan. 29-31, 1958. Final date for filing application is August 15. Sec., Dr. Sam W. Banks, 116 South Michigan Avenue, Chicago 3.

AMERICAN BOARD OF PHYSICAL MEDICINE AND REHABILITATION: *Parts I and II.* New York City, June 8-9. Final date for filing application is March 1. Sec., Dr. Earl C. Elkins, 200 First St., S. W., Rochester, Minn.

AMERICAN BOARD OF PLASTIC SURGERY: *Entire Examination.* Philadelphia, May 4-6. Final date for filing case reports was Jan. 1. Corres. Sec., Mrs. Estelle E. Hillerich, 4647 Pershing Ave., St. Louis 8.

AMERICAN BOARD OF PREVENTIVE MEDICINE: *Oral and Written. Public Health.* Schools of Public Health, April 11-13. *Aviation Medicine.* Denver, May 9-11. *Occupational Medicine.* St. Louis, April 26-28. Sec., Dr. Thomas F. Whayne, 615 North Wolfe St., Baltimore.

AMERICAN BOARD OF PROCTOLOGY: *Oral and Written. Parts I and II.* September. Sec., Dr. Stuart T. Ross, 520 Franklin Ave., Garden City, N. Y.

AMERICAN BOARD OF PSYCHIATRY AND NEUROLOGY: New York, Dec. 16-17. Sec., Dr. David A. Boyd, Jr., 102-110 Second Ave., S. W., Rochester, Minn.

AMERICAN BOARD OF RADIOLOGY: Washington, Sept. 23-28. Final date for filing application is June 1. Within the near future a special examination for certification in Nuclear Medicine will be offered to diplomates in Radiology and Therapeutic Radiology. Application must be made before Feb. 15. Sec., Dr. B. R. Kirklin, Kahler Hotel Bldg., Rochester, Minn.

AMERICAN BOARD OF SURGERY: *Part II.* Boston, April 8-9, and New York, June 10-11. Sec., Dr. John B. Flick, 225 S. 15th St., Philadelphia 2.

AMERICAN BOARD OF UROLOGY: *Written examination.* Various cities throughout the country. *Pathology and Oral Clinical.* February 1958. Location not decided. Exec. Secretary, Mrs. Ruby L. Griggs, 30 Westwood Road, Minneapolis 16.

BOARD OF THORACIC SURGERY: *Written.* Various centers throughout the country, September 1957, and the closing date for registration is July 1, 1957. Sec., Dr. William H. Tuttle, 1151 Taylor Ave., Detroit 2.

DEATHS

Graham, Evarts Ambrose ✱ professor of surgery at Washington University School of Medicine, St. Louis, and recipient of the 1950 Distinguished Service Medal of the American Medical Association, died in the Barnes Hospital March 4, aged 73, of a lung cancer. Dr. Graham was born in Chicago March 19, 1883, the son of David W. Graham, a professor of surgery at Rush Medical College. After receiving an academic degree at Princeton University, he entered Rush Medical College, where he was graduated in 1907. He interned at the Presbyterian Hospital, Chicago, then became a fellow in surgery, an assistant in surgery, and a member of the staff of the Otho S. A. Sprague Memorial Institute for Clinical Research. He was an instructor in surgery at Rush Medical College for several years, at the same time assisting his father at the Saturday clinic in the old Rush College amphitheater. In 1919, Dr. Graham became surgeon in chief at Barnes Hospital, St. Louis, from where he and J. J. Singer in 1933 reported in THE JOURNAL the first successful removal, in one stage, of an entire lung for carcinoma of the bronchus. In 1939, at the 20th anniversary of his professorship of surgery at Washington University School of Medicine, the establishment of the Graham Lectureship was announced. In the same year, he served as head of the summer teaching surgical unit at St. Bartholomew's Hospital, London. The *Medical Alumni Quarterly* of the university reported that Dr. Graham was the first American surgeon to be invited for this position, which was offered in alternate years to distinguished British surgeons. Dr. Graham retired in 1951 after 32 years as chief surgeon at Barnes Hospital, head of the department of surgery, and as Bixby professor of surgery at Washington University School of Medicine. At this time the Graham award for outstanding contributions to surgery was set up by associates and former students. He remained active in research as professor emeritus. Dr. Graham had won international recognition in 1924 for developing, together with Dr. Warren H. Cole, a method for roentgenographic visualization of the gallbladder, known as the Graham-Cole test, the report of which was first published in THE JOURNAL Feb. 23, 1924. He was elected a member of the Royal Society of Sciences of Uppsala, Sweden, an organization founded in 1710. He was a member of the National Research Council Medical Fellowship Board from 1925 to 1939, chairman of the Committee on Surgery from 1940 to 1946, and a member of the Society for Clinical Research. He was selected to give the Harvey Society Lecture in 1924 and 1934, the Mütter lecture in 1924, the McArthur lecture in 1926, the Shattuck lecture in 1928, the Alvarez lecture in 1930, the Joyce lecture in 1931, the Bevan lecture in 1932, the Caldwell lecture in 1933, the Balfour lecture in 1935, the Judd lecture in 1937, the Lister oration before the Royal College of Surgeons of England in 1947, the Churchill lecture in 1947, and the James Ewing lecture in 1950. Dr. Graham was awarded the Gross Prize in Surgery, the Leonard Prize by the American Roentgen Ray Society, the gold medal of the American Radiological Society from the St. Louis Medical Society, the gold medal of the Southern Medical Association for scientific research, the John Scott medal by the city of Philadelphia, and the St. Louis award and the Lister medal of the Royal College of Surgeons of England. He received also the Roswell Park gold medal of the Buffalo Surgical Society, the gold medal of the American College of Chest Physicians, and the gold medal of the Mississippi Valley Medical Society; also, he received the Charles Mickle honorary fellowship for 1943 from the University of Toronto. In 1951 the American Cancer Society bestowed its annual award upon him. He served the American Medical Association as co-editor of the *Archives of Surgery* from 1920 to 1945 and was chairman of the Section on General and Abdominal Surgery in 1925. He was editor of the *Journal of Thoracic Surgery* since 1931 and of the *Yearbook of Surgery* since 1929 and was co-editor of the *Annals of Surgery* from 1935 to 1945. He was the author of "Empyema Thoracis" and "Diseases of the Gallbladder and Bile Ducts," as well as of many articles in his specialty. During World War I, he entered the Medical Corps of the U. S. Army as a captain and was promptly promoted. He served with the school of neurological surgery in Chicago, did research on empyema at Baltimore, and later in France was commanding officer of Evacuation Hospital no. 34. During World War II, Dr. Graham was a member of the committee appointed by the Secretary of War to study the activities of the medical department of the Army. He organized and was the first chairman of the American Board of Surgery and was a member of the National Board of Medical Examiners for nine years. He was a past-president of the American Surgical Association, International Congress of Surgeons, Interstate Postgraduate Medical Association, American College of Surgeons, of which he was a chairman of the board of regents, American Association of Thoracic Surgery, and St. Louis Association of Surgeons. He was a member of the National Academy of Sciences and of the American Philosophical Society. Seven universities, Pennsylvania, Chicago, McGill, Western Reserve, Princeton, Cincinnati, and Emory conferred on him an Sc.D. degree; Yale granted him an M.S. and Central College an LL.D. In 1952, Washington University awarded him the honorary degree of doctor of laws and in 1956 the Alumni Association of the St. Louis College of Pharmacy and Allied Sciences bestowed its award for service to medicine.

Pfahler, George Edward ✱ Philadelphia; born in Numidia, Jan. 29, 1874; Medico-Chirurgical College of Philadelphia, 1898; formerly clinical professor and professor of roentgenology at his alma mater; emeritus professor of radiology and emeritus vice dean, department of radiology, University of Pennsylvania Graduate School of Medicine, where for many years he was professor of radiology; specialist certified by the American Board of Radiology; past-president of the American Roentgen Ray Society and in 1937 was given its gold medal and in 1930 the Strittmatter award by the Philadelphia County Medical Society; a

member of the board of directors of the aid association of the Philadelphia County Medical Society; past-president of the American Electrotherapeutic Association, American Radium Society, Philadelphia Roentgen Ray Society, and the American College of Radiology; member of the American College of Gastroenterology; in 1956 was elected president of the Dermatological Society of Philadelphia; fellow of the American College of Physicians; one of the organizers of the Philadelphia division, American Cancer Society; served as an American delegate to the 1928 International Conference on Cancer in London and at the second International Congress of Radiology in Stockholm; an honorary vice-president of the fifth International Congress of Radiology in Chicago in 1937 and for the International Conference on Cancer in 1939; in 1950 named honorary vice-president of the sixth International Congress on Radiology in London; an honorary member of the Radiology Society of France, the radiology section of the Royal Academy of Medicine in London, and an honorary fellow of the Faculty of Radiologists of London; in 1942 received the honorary degree of doctor of laws from the Ursinus College in Collegeville, where since 1935 he was a member of the board of directors and where in 1942 the new science building was named Pfahler Hall of Science in his honor; consulting radiologist, Graduate Hospital of the University of Pennsylvania, Hospital of the Woman's Medical College of Pennsylvania, and Hahnemann Hospital; wrote hundreds of articles dealing with radiology for national and international magazines; died Jan. 29, aged 83, of leukemia.

Stout, Beecher Franklin ✦ San Antonio, Texas; born in Baldwin City, Kan., May 27, 1877; Kansas City (Mo.) Medical College, 1900; specialist certified by the American Board of Pathology; fellow of the American Society of Clinical Pathologists; charter member of the Texas Society of Pathologists, which selected him as the recipient of a signal honor, the George Caldwell Memorial award, given for outstanding contribution to the advancement of medicine in Texas; in 1904 secretary of the Bexar County Medical Society and in 1920 elected honorary president; during World War I became contract clinical pathologist to the medical department of the U. S. Army, serving as chief of the serologic service at Station Hospital, Fort Sam Houston; in 1907 appointed city bacteriologist and in 1909 served a term as physician to the city public schools; for many years a member of the city board of health; served as pathologist to the Robert B. Green Memorial Hospital; for many years a member of the board of directors of the Nix Memorial Hospital and the Salvation Army Home and Hospital; formerly consulting pathologist to the old Physicians and Surgeons Hospital; died Jan. 24, aged 78, of cardiovascular failure.

Wilson, John Cree ✦ Los Angeles; born in Santa Ana, Calif., Dec. 14, 1888; University of California School of Medicine, San Francisco, 1912; at one time on the faculty of the University of Southern California School of Medicine, where he was recently named to the board of trustees; specialist certified by the American Board of Orthopaedic Surgery, of which he was a member; past-president of the American Academy of Orthopaedic Surgeons; member of the American Orthopaedic Association; fellow of the American College of Surgeons; served in the Surgeon General's Office of the U. S. Army during World War I, and at the time of his discharge in 1919 was chief orthopedic surgeon of General Hospital no. 6 in Atlanta, Ga.; in 1937 was appointed consulting orthopedist on the staff of the Crippled Children's Division of the Children's Bureau, U. S. Department of Labor; served as consultant for the western states in the development of services for crippled children under the social security act; on the staffs of the Santa Fe Coast Lines, Los Angeles County, Cedars of Lebanon, and Children's hospitals and the Hospital of the Good Samaritan, where he died Jan. 9, aged 68, of hypertension and cardiovascular disease.

Ward, James W. ✦ Greenville, Texas; born in Bagwell Aug. 8, 1879; Kentucky School of Medicine, Louisville, 1904; specialist certified by the American Board of Otolaryngology; member of the American Academy of Ophthalmology and Otolaryngology; at one time vice-president of the Texas State Medical Association; past-president of the Texas Ophthalmological and Otolaryngological Society; vice-president and member of the board of directors of the Citizens National Bank, of which he was one of the organizers; on the staffs of the Becton Clinic and Hospital and the Philips Clinic and Hospital, where he died Dec. 16, aged 77, of coronary occlusion.

West, Theodore Stephen, Port Chester, N. Y.; born in Springfield, Ill., Aug. 31, 1885; Albany (N. Y.) Medical College, 1916; specialist certified by the American Board of Radiology; an associate member of the American Medical Association; member of the American Roentgen Ray Society; fellow of the American College of Radiology; past-president of the Westchester County Medical Society and the First District of the Medical Society of the State of New York; veteran of World Wars I and II; director emeritus of roentgenology at the United Hospital, where he was director for 38 years and where he died Jan. 4, aged 71, of cancer.

Edelstein, John E. ✦ Saddle River, N. J.; born in New York City June 4, 1904; University and Bellevue Hospital Medical College, New York City, 1929; specialist certified by the American Board of Psychiatry and Neurology; member of the American Psychiatric Association and the American Institute of Psychoanalysis; veteran of World War II; served as assistant director at the Rockland State Hospital in Orangeburg, N. Y., and as psychiatrist for the bureau of child guidance of the New York City Board of Education; died in the Bergen Pines County Hospital in Paramus, Jan. 15, aged 52, of cirrhosis of the liver.

Towne, Edward Bancroft, Palo Alto, Calif.; born in West Newton, Mass., Aug. 16, 1883; Harvard Medical School, Boston, 1913; associate clinical professor of surgery emeritus at the Stanford University School of Medicine; an associate member of the American Medical Association; member of the Harvey Cushing Society and the American Neurological Association; in 1915-1916 medical officer in the British Expeditionary Forces and from 1917 to 1919 served with the Ameri-

can Expeditionary Forces; served on the staff of the Stanford University Hospitals, San Francisco; died in Palo Alto Jan. 13, aged 73, of coronary arteriosclerosis.

Fisher, Guy Rothwell ✱ Staunton, Va.; Medical College of Virginia, Richmond, 1912; specialist certified by the American Board of Otolaryngology; member of the American Academy of Ophthalmology and Otolaryngology; served as president and secretary of the Virginia Society of Ophthalmology and Otolaryngology; past-president of the Medical Society of Virginia, Augusta County Medical Association, and the Medical Society of the Valley of Virginia; member and past-president of the staff of King's Daughters' Hospital; died Jan. 15, aged 67.

Donovan, John Tom ✱ Buffalo; University of Buffalo School of Medicine, 1912; member of the House of Delegates of the American Medical Association in 1942-1943, in 1948 and 1950; fellow of the American College of Surgeons; past-president of the Erie County Medical Society; on the staffs of the Emergency, Buffalo State, and Millard Fillmore hospitals and the Sisters of Charity Hospital, where he served as president of the medical staff and where he died Jan. 3, aged 70, of coronary disease.

Baker, Howard Bigelow, Detroit; University of Michigan Department of Medicine and Surgery, Ann Arbor, 1898; died in West Palm Beach, Fla., Jan. 9, aged 84, of arteriosclerotic heart disease and fractured right leg and pelvis.

Baum, Harry, Indianapolis; Indiana University School of Medicine, Indianapolis, 1937; service member of the American Medical Association; associated with the Veterans Administration; died Jan. 14, aged 52.

Bay, Hiram Horace ✱ Chicago; College of Physicians and Surgeons of Chicago, School of Medicine of the University of Illinois, 1899; served as medical director of the Chicago Tuberculosis Institute and the Illinois Commercial Men's Association; died in the Evanston Hospital, Evanston, Feb. 1, aged 83, of carcinoma of the bladder.

Burford, Robert Stalling ✱ Brunswick, Ga.; Vanderbilt University School of Medicine, Nashville, Tenn., 1925; member of the Industrial Medical Association; served as president of the county board of health; past-president and an honorary member of the Brunswick Kiwanis Club; died Jan. 2, aged 53.

Butler, Virgil Vandalour ✱ Picher, Okla.; University of Arkansas School of Medicine, Little Rock, 1914; died Jan. 2, aged 72.

Calhoun, John Caldwell, Rayville, La.; Atlanta (Ga.) College of Physicians and Surgeons, 1902; died in the Mercy Hospital–Street Memorial, Vicksburg, Miss., Dec. 20, aged 78, of intra-abdominal abscess and perforated duodenal ulcer.

Candee, Pierce John, Buffalo; Niagara University Medical Department, Buffalo, 1897; an associate member of the American Medical Association; member of the Buffalo Academy of Medicine; served overseas during World War I; on the staffs of St. Mary's Hospital and the Sisters of Charity Hospital, where he died Jan. 1, aged 84, as the result of a fall.

Cetlinski, Constantine Anthony, Hamtramck, Mich.; Detroit College of Medicine and Surgery, 1925; member of the American Academy of General Practice; formerly councilman; director of public health since 1942; on the staff of St. Francis Hospital; died in the Holy Cross Hospital, Detroit, Jan. 2, aged 61, of cerebral thrombosis.

Chandler, Gail Ellsworth ✱ Miami, Fla.; Jefferson Medical College of Philadelphia, 1918; specialist certified by the American Board of Otolaryngology; member of the American Academy of Ophthalmology and Otolaryngology; fellow of the American College of Surgeons; consultant on the staffs of the Dade County and the Jackson Memorial hospitals; died Dec. 15, aged 63, of coronary arteriosclerosis.

Crelly, Harry Carleton ✱ Birmingham, Ala.; Medical College of Alabama, Mobile, 1902; served as mayor of Homewood, where he was president of the city council, and city councilman; died Dec. 6, aged 78, of cerebral thrombosis, arteriosclerosis, and hypertension.

Harper, William Henry ✱ Keokuk, Iowa; Howard University College of Medicine, Washington, D. C., 1918; on the staffs of the St. Joseph's and Graham hospitals; died Dec. 24, aged 67, of acute coronary thrombosis.

Huckins, Edward Spaulding ✱ Bay City, Mich.; University of Cincinnati College of Medicine, 1916; member of the American Academy of General Practice; past-president of the Bay County Medical Society; served during World War I and received the Purple Heart; member and formerly chief of staff at the Mercy Hospital, where he died Dec. 29, aged 64.

Macdonald, Hugh ✱ Peoria, Ill.; Rush Medical College, Chicago, 1919; veteran of World Wars I and II; on the associate staff of the Methodist Hospital of Central Illinois; died Jan. 14, aged 63, of myocardial infarction.

Mackey, Maud Aura, Pasadena, Calif.; University of Southern California School of Medicine, Los Angeles, 1898; retired Presbyterian medical missionary in China; died Jan. 30, aged 84.

Magness, James C., Honey Grove, Texas; St. Louis College of Physicians and Surgeons, 1890; died in Paris Nov. 11, aged 85.

Mangogna, Philip ✱ Perth Amboy, N. J.; Tufts College Medical School, Boston, 1932; physician to the board of education; on the staff of the Perth Amboy General Hospital; vice-president of the board of directors of the First Savings and Loan Association and was a past-president of the Perth Amboy Lions Club; died Dec. 29, aged 48, of a heart attack.

Marshall, Joseph, New York City; University and Bellevue Hospital Medical College, New York City, 1916; veteran of World War I; died in the Mount Sinai Hospital Dec. 22, aged 64, of myocardial infarction and arteriosclerotic heart disease.

Mayeroff, Joseph ✱ New York City; Long Island College Hospital, Brooklyn, 1916; specialist certified by the American Board of Obstetrics and Gynecology; veteran of World War I; an associate in obstetrics and gynecology at Beth David Hospital; died Dec. 23, aged 68, of arteriosclerotic heart disease.

Mihelic, Fabian Matthew ✦ Pittsburgh; St. Louis University School of Medicine, 1938; member of the American Academy of General Practice; interned at Mercy Hospital; veteran of World War II; on the staffs of St. Francis and St. Margaret Memorial hospitals; medical director of the Knights Life Insurance Company of America; shot and killed by patient Jan. 8, aged 43.

Miller, Joseph L., Thomas, W. Va.; University College of Medicine, Richmond, Va., 1900; past-president of the Barbour-Randolph Tucker Medical Society; an associate member of the American Medical Association; at one time mayor; veteran of World War I; in June, 1930, the Medical College of Virginia, Richmond, conferred the degree of bachelor of letters on him; died Jan. 6, aged 81, of cerebral hemorrhage.

Moore, Mary Thair Courtney Brown, Steger, Ill.; the Hahnemann Medical College and Hospital, Chicago, 1905; for many years a druggist; an honorary member of the staff of St. James Hospital, Chicago Heights; died Jan. 24, aged 71.

Murphy, Clarence Stephen, Livingston, Texas; Tulane University School of Medicine, New Orleans, 1914; member of the Texas Medical Association; served in France during World War I; died in the Memorial Hospital, Houston, Oct. 18, aged 69, of carcinoma of the lung.

Nair, Belle Painter, Chicago; Chicago Homeopathic Medical College, 1904; died in Somerset County, N. J., Jan. 26, aged 93.

Palmer, George Hollis ✦ Garden City, N. Y.; Cornell University Medical College, New York City, 1907; member of the American Urological Association; on the staff of the Brooklyn Hospital, Brooklyn, where he died Dec. 12, aged 76, of bronchopneumonia.

Raffl, Claude Oswald ✦ Basin, Wyo.; Syracuse (N. Y.) University College of Medicine, 1936; died Dec. 20, aged 45, of injuries received in an automobile accident.

Richardson, Arthur J. ✦ Jasper, Texas; Medical Department of Tulane University of Louisiana, New Orleans, 1911; past-president of the Tenth District Medical Society; died Sept. 15, aged 74, of acute myelogenous leukemia.

Robinson, Walter Parker, Rehoboth Beach, Del.; Hahnemann Medical College and Hospital of Philadelphia, 1907; died in the Delaware State Hospital, Farnhurst, Nov. 17, aged 73, of bronchopneumonia and arteriosclerotic heart disease.

Rogers, Charles Alexander, Freeport, Pa.; Western Pennsylvania Medical College, Pittsburgh, 1897; an associate member of the American Medical Association; veteran of World War I; for many years member of the school board and councilman; on the staff of the Allegheny Valley Hospital in Tarentum, where he died Dec. 25, aged 82, of Parkinson's disease.

Rosenfeld, Henry Max ✦ Rochester, N. Y.; Friedrich-Alexanders-Universität Medizinische Fakultät, Erlangen, Bavaria, Germany, 1912; member of the staff of the Park Avenue Hospital; died Jan. 16, aged 67, of injuries received when his automobile was struck by a train.

Rusk, Ross Philip ✦ Cadiz, Ohio; Starling Medical College, Columbus, Ohio, 1902; died Jan. 3, aged 79, of arteriosclerotic heart disease.

Schlatter, Elizabeth Lloyd Phelps, Topeka, Kan.; the Hahnemann Medical College and Hospital, Chicago, 1904; died Dec. 26, aged 86.

Schnauss, William Riley ✦ Jacksonville, Fla.; University of Georgia Medical Department, Augusta, 1916; veteran of World War I; on the staffs of St. Luke's, Brewster, and St. Vincent's hospitals; died in a hospital in Philadelphia Dec. 22, aged 61.

Smith, Henry Lee, Baltimore; University of Maryland School of Medicine, Baltimore, 1894; served on the faculty of the Woman's Medical College of Baltimore and the Johns Hopkins University School of Medicine; died in the Union Memorial Hospital Jan. 9, aged 88, after a fracture of the hip.

Smith, Martha Jane, Hutchinson, Kan.; Woman's Medical College, Chicago, 1891; died Dec. 27, aged 89.

Smith, Phillip Marvin ✦ Tchula, Miss. (licensed in Mississippi in 1911); died Dec. 24, aged 68.

Stevenson, Frank Woodford ✦ Faribault, Minn.; Rush Medical College, Chicago, 1919; died Dec. 4, aged 63.

Stockwell, William Myron, Dunedin, Fla.; University of Pennsylvania Department of Medicine, Philadelphia, 1904; veteran of World War I; for many years associated with the Cedarcrest Sanatorium, Hartford, Conn.; died Jan. 3, aged 76, of pneumonia and uremia.

Stuard, Samuel Griggs, Detroit; Howard University College of Medicine, Washington, D. C., 1927; veteran of World War I; died Dec. 13, aged 60, of arteriosclerosis.

Taggert, James Almon, Salamanca, N. Y.; University of Buffalo School of Medicine, 1896; an associate member of the American Medical Association; died Jan. 1, aged 84.

Taylor, William Merritt, Oklahoma City; Bellevue Hospital Medical College, New York City, 1898; professor emeritus of pediatrics at the University of Oklahoma School of Medicine; specialist certified by the American Board of Pediatrics; member of the American Academy of Pediatrics; an associate member of the American Medical Association; on the staff of St. Anthony Hospital; died Jan. 2, aged 84, of arteriosclerotic heart disease.

Temple, Franklin Stuart, Raymond, N. H.; Albany (N. Y.) Medical College, 1892; died in Brentwood Dec. 7, aged 90, of arteriosclerosis.

Thompson, James Solomon, Durham, N. C.; Leonard Medical School, Raleigh, N. C., 1914; veteran of World War I; died Dec. 22, aged 64, of heart disease and hypertension.

Tice, Eldon Webb ✦ Los Angeles; College of Physicians and Surgeons, Los Angeles, 1918; fellow of the International College of Surgeons and the American College of Surgeons; past vice-president of the Los Angeles County Medical Association; on the staffs of the Cedars of Lebanon Hospital and the Presbyterian Hospital–Olmsted Memorial; died Jan. 3, aged 73, of carcinoma of the liver and pancreas.

FOREIGN LETTERS

AUSTRIA

Diseases Similar to Poliomyelitis.—At the meeting of the Vienna Society of Physicians on Jan. 18, 1957, R. Bieling stated that the cases of poliomyelitis seen in 1956 were produced by three types of poliomyelitis virus. Schneider's disease, which is to be considered an etiological and clinical entity and is produced by a virus of the louping ill group, had to be ruled out when cases were reported early in 1956. This virus is detected directly in only a few patients, but its presence is routinely indicated by a complement-fixation test. A third epidemiologically isolated group, which showed clinical peculiarities, is characterized by the finding of Moraxellas and by serum reactions to an antigen of this bacillus. This disease spread over the whole country. Infections produced by the Coxsackie virus, type A, were observed, but none caused by the carrier of encephalomyocarditis or choriomeningitis or by adenovirus were seen.

Bacteriological Findings in the Spinal Fluid in Epidemics of Serous Meningitis.—At the same meeting, H. Flamm stated that an epidemic of serous meningitis starting in April, 1956, spread from west to east Austria. The disease reached the eastern side of the Alps in autumn, where it occurred after the subsidence of an epidemic of viral meningoencephalitis. Serous meningitis is characterized by a double course of fever with separate peaks, meningism, and reflex abnormalities. The cell count of the spinal fluid rises to almost 6,000, chiefly lymphocytes. Moraxellas can often be found in the spinal fluid. Agglutinins against these organisms were found in the patients' serum, thus indicating a probable causal relationship.

Renal Calculi.—At the meeting of the Vienna Society of Physicians on Feb. 1, R. Herbst referred to the stone-dissolving action of madder extracts, repeatedly mentioned in the literature and apparently proved in experiments in animals. One of the speaker's patients had taken madder for a prolonged period after surgical removal of renal calculi. In spite of this treatment, a coral calculus developed in the kidney. This necessitated a nephrectomy. Stones also developed in the upper calices of the other kidney. On section, both stones showed red zones with the chemical properties of madder and calcium phosphate and carbonate. The speaker did not imply that the madder caused the calculi, but he did imply that it was involved in the composition of the stone and that it was in no sense a stone solvent. In fact, no such drug is known to exist.

Endobronchial Diathermy.—At the same meeting, A. Riccabona stated that endobronchial diathermy has been applied with good results not only in minor but also in major operations. Its use has not yet become routine in laryngology, however, because its application to the throat involves the risk of stenosis. The speaker has used it in the trachea and bronchi. The surgical approach from outside to trachea and bronchi constitutes a major operation, whereas they are easy to reach with the endoscope. The advantages of electrosurgical treatment include minimal bleeding and a smooth scar. Although this approach cannot cure carcinoma of the bronchi, it can afford much relief by helping to maintain a free airway or by reopening a stenosed bronchus. The removal of bleeding adenomas or of intratracheal strumas from the bronchi is easily accomplished. Papillomas and hemangiomas may also be removed without great risk.

Hormonal Treatment of Tuberculosis.—At the same meeting, H. Chiari stated that from the pathologist's point of view the results of treament of tuberculous patients with cortisone are often poor. A favorable action on infiltrative tuberculous processes with hormonal therapy does occur, but the risks do not make its use advisable in most patients.

INDIA

Postgraduate Institute.—The prime minister, while inaugurating the Institute of Postgraduate Medical Education and Research at Calcutta in January, warned physicians of all systems of medicine against developing the belief that they alone possessed the key to the riddle of life. He said that a physician's mind should be open and that he should learn by experiment and on no account get into a rut. He stressed the need for more medical research in Indian universities and said that medical education and research should balance their activities between pure scientific research unrelated to the common man's needs and practical research or development having a particular object in mind.

Rockefeller Grants.—The Rockefeller Foundation announced the grant of $2,500 to the Madras Medical College toward the development of its department of pediatrics and $88,000 to the Indian Council of Medical Research in Delhi for neurological research. Because of the prevalence in India of a number of diseases involving the nervous system, such as lathyrism, nutritional deficiencies, and leprosy, an excellent opportunity for neurological investigation is provided. In particular, leprosy, which commonly produces selective damage to nerves difficult or impossible to duplicate experimentally, offers unique opportunities for study of the lesions and the function and sensory distribution of nerves.

Cooperative Dispensary.—A new experiment has been started in Hyderabad by the opening of a cooperative dispensary. The subscription rate is low enough to attract people of all lower income groups. It is mainly

The items in these letters are contributed by regular correspondents in the various foreign countries.

for the special benefit of this social class, and the facilities offered are wide enough to take care of the everyday ailments of its members. One such dispensary was inaugurated by the Union Deputy Minister for Health on Sept. 15 in a thickly populated area of the city. Established under the auspices of the state medical department to give speedy relief and suitable medical service to the 30,000 citizens in that area, it provides outpatient treatment, x-ray examination, pathological examination, and medicines free of cost. Home visits by physicians attached to the dispensary are made free of charge when the patient is unable to attend the dispensary. Patients with serious illnesses requiring inpatient treatment will be admitted to the city hospitals. Facilities are also provided for consultation by eye, ear, nose, and throat specialists. Service is available day and night. Two emergency beds and an ambulance are provided. The medicines prescribed during home visits have to be purchased by the patient. Civil servants are enrolled as members free of charge on the presentation of certificates from heads of departments.

NEW ZEALAND

Sympathy with Hungary.—The University Council and Professorial Board of the University of Otago and the Otago Branch of the Association of University Teachers sent a message to the Committee of Science and Freedom, which has its headquarters in England, sympathizing with the plight of universities in Hungary. The committee had earlier sent an appeal to the universities of the world to proclaim their solidarity with the Hungarian universities. A resolution was passed to offer a scholarship to a Hungarian refugee student.

Aldosteronism Induced by Antioxidants.—Denz and Llaurado (*Proc. Univ. Otago M. School* **34**:25, 1956) have reported that two antioxidants, 2:6-di-*tert*-butyl-4-methyl-phenol and commercial butylated hydroxyanisole, which is a mixture of two isomers, 85% being 2-*tert*-butyl-4-methoxyphenol and 15% 3-*tert*-butyl-4-methoxyphenol, produce similar effects on sodium and potassium excretion in the urine when given to rabbits by stomach tube in doses of 1 Gm. per day. The sodium excretion is increased from 0.137 to 1.179 mEq. per day and the potassium from 5.394 to 6.690 mEq. per day. The adrenals show a gross decrease in fat staining in the zona glomerulosa, the region believed to be the site of aldosterone production. At the same time, there is an increased excretion of aldosterone in the urine, e.g., from an initial level of 0.032 mcg. to about 0.151 mcg. per day. No gross lesions in the kidney that can be attributed to treatment have been detected.

The tenfold increase in urine sodium has little effect on serum sodium in these acute experiments, but the serum potassium level falls steadily from 3.98 to 1.85 mEq. per liter after five days of treatment. This is associated with a fall in potassium and a rise of sodium in voluntary muscle. The heart muscle shows little change in sodium and potassium levels. After five or more doses, rabbits develop muscular weakness, especially in the hind limbs. The toxic effects of these antioxidants are attributed to the disturbance of sodium and potassium balance in the body. It is postulated that the primary change is an inability of the kidney to reabsorb sodium, which is followed by a compensatory aldosteronism resembling that of the sodium-losing nephritis. The doses of phenolic antioxidant administered in these experiments are far above those used in food preservation.

Differential Lobar Spirometry.—Differential bronchospirometry is a current technique used to assess ventilatory function and oxygen uptake of each lung in patients prior to thoracic operations. In adults requiring bilateral lobectomy for bronchiectasis in whom, despite bronchographic evidence of bronchiectasis, the lobe remains well aerated, though emphysematous, the problem arises of how much that lobe contributes to the total function of the lung. In patients with low respiratory reserve this point should be clarified before resection is undertaken. Carlen's three-lumen endobronchial catheter differentiates the function of the left lung from that of the upper lobe and the confined middle and lower lobes of the right lung, but it does not show how much each of the five main lobes contributes to the lung function, nor does it show the probable effect of lobectomy. Borrie (*Proc. Univ. Otago M. School* **34**:28, 1956) has devised a method that has proved satisfactory and can be extended to all varieties of lobar bronchiectasis in which this problem arises. The usual differential spirometry of each lung is estimated with Carlen's double-lumen tube. The tube is temporarily removed, a Longworth bronchoscope inserted, the affected bronchi plugged with cotton swabs, and the double-lumen Carlen's tube reinserted. Spirometric tracings of the remaining patent lobes are made, and then the tube is removed, followed by the removal of the bronchial plugs and the bronchoscope. The difference between the readings gives an estimate of lobar function.

Blood Pressure in a Population Survey.—Professor Smirk and co-workers (*Proc. Univ. Otago M. School* **34**:20, 1956) have provided further support for the strict standardization of conditions of blood pressure measurement. Although the frequently observed rise of blood pressure with age is due in part to the inclusion of a relatively large number of frankly hypertensive persons in the older age groups, some rise with age still occurs when all pressures above 160/100 mm. Hg are excluded. Among the curves published by various authors, there are significant differences in the average casual pressures at the various ages, even though higher pressures are shown in older people. To show how such differences may arise, a survey was made of patients attending skin and orthopedic clinics at the Dunedin Hospital. It was believed that patients would be unlikely to report to these clinics because of any disorder associated with hypertension. On the patient's arrival, his blood pressure was taken without explanation. After this the patient was asked to attend the clinic another morning for further blood pressure readings. On this second

occasion the pressure was taken every half minute for a period of 20 minutes with the patient at rest. Every reading was recorded. The initial pressure was called the first casual, and the first reading at the second session the second casual. Subsequent readings were numbered consecutively. The lowest reading after the second casual was called the near basal. When comparing the results, it was observed that, despite the fact that the first casual and near basal curves are both based on blood pressure recordings made at different times in the same series of 201 males and 169 females, the first casual reading was higher and the near basal reading was lower than that shown on the usual curves relating pressure to age. These differences in level were achieved by apparently trivial change in the circumstances of the measurement. It is clear that age-pressure curves, even those based on large population surveys, can be compared only if the conditions of measurement are rigidly standardized.

UNITED KINGDOM

Neonatal Cold Injury.—Every winter brings a number of neonatal deaths due to accidental exposure to cold. No reports are made to the registrar of births and deaths, because it is not officially recognized as a cause of death and is misdiagnosed as hemorrhagic pneumonia, sclerema neonatorum, and edema of the newborn. The condition has been described by Mann and Elliott (*Lancet* **1**:229, 1957). Many babies are delivered in the home, where, in the winter months, bedrooms are seldom heated, so that it is quite common in spells of cold weather for the temperature in them to fall to 32 F or below. Babies are sometimes delivered under such conditions and continue to be fed, dressed, and bathed in cold surroundings. Cold injury does not develop in every newborn infant exposed to low temperatures. Factors such as the amount of subcutaneous fat, birth injury, asphyxia at birth, inanition, and infection are other possible factors in the etiology. Such patients are usually admitted to the hospital after a sudden fall in the outside temperature.

The features that are present on the baby's hospital admission are apathy, refusal to nurse, a feeble cry, coldness to the touch, swelling of the extremities and of the eyelids, a hemorrhagic tendency, and oliguria. The condition is often overlooked as the baby does not look ill. The hands, feet, and face are strikingly red, although often with a cyanotic tinge. Local hardening of the superficial tissues over the frankly edematous parts, usually the legs, is common at some stage in the illness. A profound hypoglycemia has been noted, and epileptic fits are associated with this. In 14 patients seen by the authors, the nature of the illness had not been suspected. Eight patients died, and in five of them massive pulmonary hemorrhage was observed at autopsy. No pathogenic organisms were recovered on culture. The four essentials in treatment are rewarming in a room temperature of 70 to 80 F, adequate feeding, the administration of 15 to 20% glucose by intragastric drip to correct the hypoglycemia, and the prevention of infection. The condition should never arise if the room temperature is not allowed to drop below 65 F in the first 14 days of the infant's life.

Cesium Unit.—A clinical trial is to be carried out in the Royal Marsden (Cancer) Hospital, London, under Professor Smithers, on radioactive cesium (Cs^{137}). The unit, designed by Professor Mayneord, is the second of its kind in the world. The first was at Oak Ridge, Tenn. Another unit with a rotating apparatus containing two Cs^{137} sources is also being built at Southampton. The Cs^{137} is derived from atomic waste products from the establishment of the Atomic Energy Authority at Windscale. The unit, which emits gamma rays, with energy concentrated over a narrow band of short wave length, is equivalent in efficiency to the much more costly 660-kv. x-ray therapy machine. Because of the narrow band, absorption by the tissues is more even and there is little risk of differential absorption from bone; also, the damage to skin and superficial tissues is less. The amount of protection needed is less than with the radioactive cobalt source, so that the Cs^{137} apparatus is not so complicated and is more readily manipulated. It is better for treatment at short distances, as in the case of tumors of the head and neck. In cost, a Cs^{137} unit is about the same as that of the conventional x-ray therapy plant, and the running costs are negligible.

Changing Pattern of Pernicious Anemia.—Sir Stanley Davidson has compared the clinical records of 250 patients with pernicious anemia with those of 250 patients seen in the 1920's before liver treatment was introduced (*Brit. M. J.* **1**:241, 1957). The difference between the clinical findings in the two periods, which is striking, is undoubtedly a consequence of the improved facilities for early diagnosis and treatment. The degree of anemia in patients seeking advice is far less at present than it was 30 years ago. Even the sex incidence has changed. Formerly more frequent in men, it is now more frequent in women. Both in the period of the 1920's before liver treatment was introduced and in the present period, the symptoms most commonly encountered in pernicious anemia are general weakness, fatigue, dyspnea on effort, and numbness and tingling in the hands and feet. The last-mentioned occurs much less frequently now (38% of cases) than it did formerly (almost 100% of cases). This is also true of soreness of the mouth and tongue, which was present in only 25% of the present series but in 43% of the earlier series. Diarrhea occurred in only 9% of Davidson's patients but in 51% of those treated in the 1920's.

Apart from pallor of the skin and mucosa, the most common physical sign today is chronic atrophic glossitis, which either did not occur or was not reported formerly. Acute glossitis, with a red beefy tongue, was then more common, being seen in 42% of the patients, whereas it was seen in only 5% of the current series. Fever, which is related to the severity of the anemia, was present in 22% of the recent cases in contrast to 79% in the early ones. Icterus and splenomegaly are

other "textbook" signs that are rarely seen now. The degree of neurological involvement has altered slightly. About 7% of the patients seeking advice today have spinal cord damage compared with 11% 30 years ago. One of the most striking differences is in the degree of anemia. Formerly 20 to 25% of the patients had erythrocyte counts of under 1 million per cubic millimeter, whereas now the corresponding figure is only 1%. Thus the textbook descriptions of pernicious anemia are misleading to students. There are no pathognomic symptoms or signs today. Diagnosis can only be based on accurate blood examinations supplemented, if necessary, by special tests.

Antibacterial Action of Chlorophyll.—Numerous reports have been published on the successful treatment of chronic infected wounds with water-soluble chlorophyll derivatives, which have been presumed to act by bacteriostasis or as bactericides. Mowbray, who has investigated the antibacterial activity of sodium potassium copper chlorophyllin, one of the commercial preparations available, reports that it has some bacteriostatic action but that it is slight (*Brit. M. J.* **1**:268, 1957). It has some activity against certain gram-positive organisms, including Micrococcus pyogenes var. aureus, Streptococcus pyogenes, Diplococcus pneumoniae, and pathogenic clostridia, but, after a period of bacteriostasis, bacterial multiplication proceeds in the presence of all concentrations in which the preparations are likely to be used. After repeated culture in the presence of chlorophyll, Mowbray found that M. pyogenes var. aureus becomes resistant to the temporary bacteriostatic effect of chlorophyll. There is, however, some potentiation of antibiotics such as penicillin, oxytetracycline, and streptomycin by subinhibitory concentrations of chlorophyll preparations, although this appears to be due to some physical surface-active effect rather than to a true synergism or potentiation.

Canicola Fever.—Human leptospirosis from contact with infected pigs has been described but not observed in Great Britain until recently. Coghlan and co-workers have now reported five cases of canicola fever among workers on pig farms near Edinburgh (*Brit. M. J.* **1**:257, 1956). Serologic examination of 47 workers on 12 Edinburgh farms showed that 19 had at some time been infected with Leptospira canicola. It was most likely that the infection came from contact with the pigs, since on one farm 77% and on another 44% of the pigs tested had serum antibodies to L. canicola and the organism was excreted at times in large numbers in the urine. This high incidence of human infection is striking in view of the small number of cases resulting from contact with dogs, 25 to 40% of which show serologic evidence of infection. Infected pigs can be asymptomatic. Some were inoculated with a virulent culture of L. canicola and others with infected urine. They developed antibodies to titers of 1:10,000 without symptoms. Workers on pig farms, exposed to excretion and subject as they are to cuts and minor bruises, have ample opportunity of becoming infected. As canicola fever in man can be fatal, all possible steps should be taken to prevent the disease by informing farmers and workers on pig farms of the risks and by introducing such measures as washing down the pigpens with hypochlorite solution, scrupulous personal hygiene, and exclusion of dogs from pig farms.

Misleading Sedimentation Rates.—Alexander and Andrews state that in following the course of rheumatic fever sedimentation tests made with either heparinized or oxalated blood may be seriously misleading, with results being obtained that are not reproducible (*Lancet* **1**:240, 1957). They repeatedly took sedimentation rates with both citrated and heparinized blood in 60 patients with rheumatic fever. In 13, there was at some stage in the course of the disease a difference of more than 20 mm. between the readings of duplicate Westergren sedimentation tubes filled from the same heparinized sample of blood. The discrepancies also occurred when oxalated blood was used instead of heparinized blood. The more reproducible sedimentation rate of citrated blood seems to depend on dilution and not on the presence of citrate ions. In the shorter Wintrobe tube, discrepancies would probably be less common than in the longer Westergren tube. These variations in the sedimentation rate were not confined to patients with rheumatic fever.

Saturated Fats and Serum Lipids in Atherosclerosis.—It has been suggested that atheroma may be associated with a high dietary intake of cholesterol, fat, calories, saturated fats, or degerminated cereals. Handel and co-workers (*Lancet* **1**:245, 1957), having observed over a period of three years the inconstant effect of low-fat diets on the serum lipid and cholesterol levels of patients with atherosclerosis, gave foods containing unsaturated vegetable fats, but no refined cereals, to such patients. Lard and other animal fats, white bread, and foods made from degerminated flour were forbidden and margarine and butter restricted to 25 Gm. daily. Bread and foods made from whole wheat flour, meat, milk, eggs, cheese, and soybean oil were allowed in any quantity. In addition, the patients were given 2 or 3 Gm. of soy lecithin and 25 to 50 Gm. each of peanuts, peas or beans, and whole soybean flour. This diet was given to 16 patients with atherosclerosis for an average of 110 days. It lowered the serum cholesterol and serum lipids in patients with atherosclerosis, but only when the values had been high initially.

Radioactive Vitamin B_{12} in Neurological Diagnosis.—Subacute combined degeneration of the spinal cord is caused by a deficiency of vitamin B_{12}, the absorption of which is impaired by lack of extrinsic factor. Clinically, however, the diagnosis is not always clear-cut, and the response to vitamin B_{12} has been used as a diagnostic test. This, however, involves the technically difficult and laborious estimation of the serum level of vitamin B_{12}, and the result is valueless if the patient has already received the vitamin. Berlyne and coworkers confirm the diagnosis by demonstrating that the patient cannot absorb vitamin B_{12} (*Lancet* **1**:294,

1957). This is done by administering vitamin B_{12} containing radioactive cobalt (Co^{56}), which has a half-life of 72 days and the use of which is virtually free from risk. The radioactive vitamin is diluted to give a concentration of 0.5 μc per milliliter and inactive vitamin added to bring the concentration to 2 mcg. per milliliter; 1 ml. of this preparation is given orally and the percentage of Co^{56} in the urine estimated with a scintillation counter. If defective absorption is demonstrated, the test is repeated, 100 mg. of intrinsic factor being mixed with the radioactive preparation. Patients with subacute combined degeneration excrete only an average of 0.6% of the dose of vitamin B_{12} as compared with 4 to 7% excreted by normal subjects. If the patient still fails to excrete the radioactive material at normal levels after the combined administration of radioactive vitamin B_{12} and intrinsic factor, the primary abnormality is not defective production of intrinsic factor and the condition is not subacute combined degeneration.

The Diabetic Driver.—Under the Road Traffic Act of 1930, any person who drives an automobile under the influence of alcohol or a drug is liable to disqualification from driving for at least a year and on indictment is liable to six months' imprisonment or an unlimited fine or both. On summary conviction before justices, the first offense is punishable by a fine of $140 or four months' imprisonment and a subsequent one by $280 or four months' imprisonment or both. An appeal has just been heard against the dismissal by Cheshire justices of a charge brought against a diabetic driver for unlawfully driving a car under the influence of a drug. The patient had had diabetes for 12 years, and, after having taken his usual dose of insulin, he had driven two miles to a movie. Some hours later he was found at the wheel of his car in a hypoglycemic coma. The justices dismissed the case on the basis that insulin was not a drug. The prosecution appealed the case, and the lord chief justice held that insulin is a drug within the meaning of the Road Traffic Act, in that it was given to cure or alleviate a disease. The two other judges of appeal concurred. The decision has caused concern among the British Diabetic Association, whose membership is 20,000. The number of diabetic drivers developing hypoglycemia while in charge of a car is extremely small, and, in the past, cases that have come before the courts have been dealt with by a fine. In the London area, a diabetic may drive a car provided he submits to an annual medical examination. The consensus is that, if the accurate regulation of insulin intake and diet makes the risk of hypoglycemia negligible and the physician is satisfied that the patient understands his condition, there is no reason why the latter should not drive a car; however, if the patient allows himself to develop hypoglycemia, he may be unable to control a car and is then liable to the penalties imposed for driving under the influence of a drug.

Congenital Cardiovascular Lesions.—The incidence of congenital cardiovascular lesions is not accurately known because clinical signs may not develop until after an infant has left the hospital. Moreover, the systolic murmur heard in 1 to 2% of all newborn babies may disappear in a few weeks. Capon, who has studied the records of Liverpool hospitals, estimates that the incidence of congenital abnormalities of all types, including cardiovascular abnormalities, is about 20 per 1,000 live births (*Brit. M. J.* 1:335, 1957). An analysis of 20,339 live births showed that 56, or 2.7 per 1,000, of the babies had a congenital cardiovascular lesion, while an additional 43, or 2.1 per 1,000, were possible victims. From these figures, Capon estimates that the incidence of congenital heart deformity in the Liverpool area is probably 3 to 4 per 1,000 live births. Of the 56 definite cases, 13 of the patients died during the first two months of life. About 25% of all infants with congenital cardiac lesions born alive have serious and often multiple anomalies of the heart and large vessels and sometimes abnormalities elsewhere. These infants are seldom suitable for surgical treatment, especially when there are such complications as pneumonia or atelectasis. The deaths in the first five years of life among infants with congenital cardiac lesions reduce the incidence of these conditions to about 2 per 1,000 during school age. This figure would represent about 15,000 affected children in Great Britain. Capon says this number may be too low, as examinations by the London County Council of school children in 1954 revealed an incidence of 4.6 cases of congenital heart disease per 1,000 children.

Cost of National Health Service.—The gross expenditure on the National Health Service in the past fiscal year in England and Wales was $1,375,371,439, which was $5,480,888 less than that in the previous year. The expenditure in Scotland was $171,951,354. The cost of the pharmaceutical service in England and Wales was $127,116,918 and in Scotland, $14,430,224. There were 247 million prescriptions dispensed at an average cost of 63 cents each. Both the total number of prescriptions and the individual cost have steadily increased since the service began in 1948. In England and Wales, 36% of the prescriptions were for proprietary preparations; in Scotland, the corresponding percentage was 46. Of all prescriptions, 4.5% were for preparations that the Ministry of Health had suggested to physicians should not be prescribed.

Antilipemic Agent.—Heparin injected into a patient who has just had a fatty meal accelerates the disappearance of visible lipemia, but its use for this purpose for the possible prevention of atherosclerosis is impracticable because of its anticoagulant action. Besterman and Evans (*Brit. M. J.* 1:310, 1957) have used a lower sulfonated laminarin (laminarin sulfate M) derived from the seaweed Laminaria cloustoni as a heparin substitute. Unlike heparin, this preparation has little or no effect on blood clotting. Patients with ischemic heart disease were given 100 mg. intramuscularly or intravenously after a fatty meal, and the results obtained were compared with those in controls given 10,000 units of heparin. The effects on the electrophoretic pattern of the serum lipoproteins and

blood-clotting time were compared. After an intravenous injection of laminarin sulfate M, the electrophoretic patterns in all patients showed changes similar to those following an intravenous injection of heparin. The lipemic serum cleared, the electrophoretic mobility of the lipoproteins increased, and the distribution of lipoproteins was altered in the same way as with heparin. The changes could be detected soon after injection and lasted for four to six hours; the effect of heparin may last up to 24 hours. The clotting time of whole blood was uninfluenced by the laminarin sulfate M. Tests were also made with higher sulfonated laminarin, which contained more sulfonate groups, but in the same dose this produced no effect. Since laminarin sulfate M possesses the antilipemic properties of heparin without the hazards of its anticoagulant action, it appears to be a suitable substance with which to study the effect of the prolonged administration of lipemia-clearing substances on the course of atherosclerosis in man.

Costs Rise in Hospitals.—The cost of caring for a patient in all types of hospitals has risen sharply. In the London teaching hospitals it averaged $76.11 a week in the year ended March 31, 1956, compared with $70.84 in the year before. The hospital costing returns of the National Health Service, published by the Ministry of Health, also give detailed cost figures for 2,500 nonteaching hospitals in England and Wales. Even they are up in price by 35 cents to $2.80 per patient per week. Mr. Turton, Minister of Health, has sent copies of the hospital costing returns to all hospital authorities, urging them to use the information to improve efficiency and economy. Hospitals are asked to report what action they take and the results they achieve. A new system of departmental and unit cost accounting, based on the recommendations of a working party, will be introduced in hospitals on April 1. Among London teaching hospitals, St. Bartholomew's is no longer the costliest, as it had been for two years. Its average weekly figure, $83.15 per patient, is exceeded by the Royal Free Hospital ($88.68), St. George's ($84.05), and St. Thomas's ($86.76). The comparable amount per inpatient in provincial teaching hospitals was $60.36 as against $56.00 in 1954-1955. The figure for all nonteaching hospitals in the "acute" group was $49.70 as compared with $46.06 in 1954-1955. "Acute" hospitals are those with not more than 15% of beds allocated to patients with mental, thoracic, and chronic diseases and to convalescent care. The average cost in maternity hospitals rose from $51.43 in 1954-1955 to $55.71 in 1956. For tuberculosis hospitals the increase was from $30.67 to $35.17.

State of the Public Health.—Insistence by customers on hygienic practice in food shops, restaurants, and cafes is urged by Sir John Charles, Chief Medical Officer, Ministry of Health, in his annual review of the state of the public health. Legislation alone could not bring improvement. Consumers must play their part in keeping the standard of performance satisfactory. Up to this time they have not been conspicuous in their demands. Last year, 8,961 outbreaks of food poisoning were reported, compared with 6,016 the year before. The state of nutrition of the people showed no deterioration during the year. Sir John states that the practice of those countries abroad that do not countenance smoking in theaters or even in public conveyances deserves study, if not imitation. Sir John deplores neglect of the teeth. One adult in five is toothless. Still, the nation's health continued, in general, to be satisfactory. The expectation of life at birth is now 68 for a boy and 73 for a girl.

Visit to Poland.—The *British Medical Journal* of Nov. 24, 1956, published an account of a visit to Warsaw by Dr. R. H. Dobbs, and the issue of Dec. 15 contains a letter by Prof. Ian Aird, who accompanied Dr. Dobbs, in which he asks permission to modify some of Dr. Dobbs' interpretations of Polish opinion. Dr. Dobbs said there was in Poland no hope, nor even wish, for a return to a free medical profession such as existed in Poland and in Great Britain before World War II. Professor Aird says that we cannot tell whether or not there is really any hope or any wish for a return to a free medical profession in Poland. Dr. Dobbs says also that there is a full realization that communism will remain the basis of the country's economic and social system, but Professor Aird would modify this statement by saying that there is a general belief in Poland that communism will, at least for some time, remain the basis of the country's economic and social system. Poles to whom he talked ascribed the tragic poverty of their country to an inefficient application of communism in Poland and to the unfavorable balance of her export trade. Most Poles do not yet suspect that the poverty of their country may be due to intrinsic defects of the communist ideology and to that perfect equality of income that Poland has very nearly attained. If poverty continues in spite of what now appears to be a highly efficient application of communist principles, most Poles will gradually begin to suspect that there is something intrinsically faulty in the actual principles of communism and of perfect equality of income. Professor Aird believes that, though the Poles apparently do not realize it now, they may in due course see the errors of communism and depart from the ideology.

Shortage of Physiotherapists.—The Orthopedic Group Committee of the British Medical Association is concerned about the shortage of physiotherapists. The problem would be eased if there were more facilities for training. More teachers are badly needed but are hard to find because of inadequate salaries. The Joint Consultants Committee was asked to take the matter up with the Ministry of Health.

CORRESPONDENCE

ENRICHMENT OF FLOUR IN GREAT BRITAIN

To the Editor:—We were very interested to read the report "A Brief History of the Enrichment of Flour and Bread" by Dr. Russell Wilder, published in THE JOURNAL, Dec. 22, page 1539, but we feel that, although inevitably the facts had to be condensed, the report does less than justice to the pioneer work of the British milling industry. It was in 1938 that the industry, to whom we are advisers, decided as a first step and on the advice of one of us to enrich white flour with vitamin B_1. To this end arrangements were made with one of the large pharmaceutical firms to produce the vitamin at an economical price and on a scale that would be sufficient to enrich all the flour in the country.

In 1939, on the outbreak of World War II, the government took over the control of the milling industry and in July, 1940, gave enrichment statutory authority. The level of addition was such that the vitamin B_1 content of the enriched flour would be approximately 0.24 mg. per 100 Gm. (or 1.1 mg. per pound). This level was identical to that originally proposed by the milling industry and incidentally the same as that obtained in Great Britain today. Naturally, war conditions slowed down the progress of this program, and, in fact, the preparation of the master mix and its dispatch to millers was carried out by a few members of the scientific staff of the Research Association of British Flour-Millers. Nevertheless, by March, 1942, when, due to the shortage of wheat, white-flour milling was discontinued, approximately 40% of the flour of this country was being enriched.

Toward the end of the war, the government called a conference to discuss the postwar flour and bread of the country. The milling and baking industries favored a return to enriched white flour; the government's scientific and medical advisers preferred to retain the high-extraction "National" (80-85%) flour of the war years. No agreement was reached, but one sequel was the Widdowson-McCance investigation on German school children (Studies on the Nutritive Value of Bread and on the Effect of Variations in the Extraction Rate of Flour on the Growth of Undernourished Children, Medical Research Council Special Report Series, no. 287, 1954).

In 1953, the milling industry was decontrolled and white flour milling again permitted, provided it was enriched with vitamin B_1, nicotinic acid, and iron at levels of 0.24, 1.65 and 1.60 mg. per 100 Gm. of flour respectively. It could, however, only be sold at a much higher price than "National" flour because the latter carried a government subsidy, and, as a result, the sales of white flour both to bakers and direct to the consumer was small; at least, this was the view of the milling and baking industries. In 1955, however, the government, no doubt greatly perplexed by the conflicting scientific and medical views on the desirable rate of extraction of flour, asked the president of the Royal Society to nominate a medical and scientific panel to consider all the evidence and make recommendations. The panel, under the chairmanship of Lord Cohen, has reported (Report of the Panel on Composition and Nutritive Value of Flour, Her Majesty's Stationery Office, London, 1956). Its main finding was that, on the evidence available, enriched white flour would maintain the health of the population as well as 80% "National" flour. On the other hand, a nonenriched white flour would not. The panel also added that it was impressed by the evidence for the demand for white flour and bread.

The government has implemented the findings of the Cohen panel by removing the subsidy on high-extraction flour. The levels of enrichment of white flour are the same as those prescribed in 1953. It seems likely that, now that the price differential has been removed, the majority of the people will revert to using white bread made from enriched flour.

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THANKS FROM A HUNGARIAN PHYSICIAN

To the Editor:—As one of the Hungarian physicians arriving as refugees in the United States, I would like to have the following comment published in THE JOURNAL:

Let me express my thanks in the name of the escaped Hungarian physicians for the generous help granted by the American Medical Association through the American Medical Society of Vienna in lightening the burdens of emigrant physicians in Austria. This support has a special value for us because the A. M. S. was the only professional organization helping their escaped colleagues in that way.

MIKLOS TAPAY, M.D.
Camp Kilmer, N. J.

MEDICAL LITERATURE ABSTRACTS

INTERNAL MEDICINE

Cardiac Arrest: A Resumé of Experimental and Clinical Data. J. W. Hinton, H. E. Stephenson Jr. and P. A. del Missier. J. Nat. M. A. **49**:11-18 (Jan.) 1957 [New York].

Results of recent experiments performed on dogs and observations in 1,717 patients with cardiac arrest suggest that the concept of anoxia or hypoxia as the primary factor in the sudden failure of the heart to maintain circulation has not been proved. Cardiac arrest may be due to ventricular fibrillation or cardiac standstill. The mechanism of ventricular fibrillation is not understood and, except for hypothermia, atropine is an excellent means of minimizing the chance of its appearance. Cardiac standstill can only result from failure of the ventricular specific tissue (sinus node, atrioventricular node, and atrioventricular bundle) to form a stimulus which, in turn requires the presence of three conditions: (1) disease of the ventricular specific tissue; (2) depression of the remaining functioning elements by drugs or anesthetic agents; and (3) the reflex suppression of stimulus formation in the auricle. Of the 1,717 patients with cardiac arrest, 536, or about 32%, survived. About 25% of the patients with cardiac arrest were in the first decade of life. This suggests that there is little relationship between disease of the myocardium per se and sudden cardiac standstill. Cardiac massage was started within 4 minutes of the time of arrest in 94% of the successfully resuscitated patients. Seventy-two of the resuscitated patients were followed up for 4 years or longer, some for 8 years, and 1 for 15 years. Fifty-one of the 72 patients were physically and mentally normal at the end of the 4-year follow-up period.

Obstruction of Large Portions of the Lungs in Bronchial Asthma. H. A. van Geuns. Nederl. tijdschr. geneesk. **100**:3702-3711 (Dec. 15) 1956 (In Dutch) [Haarlem, Netherlands].

This report is concerned with 3 patients in whom chronic bronchitis and bronchial asthma were associated with occlusion of large portions of the lungs. The first patient was a 34-year-old woman who had chronic eosinophilic bronchial catarrhs and attacks of asthma as the result of bronchial allergy to mold spores. The bronchus of the middle lobe and several bronchi of basal segments of the right lung became occluded by mucus plugs that contained eosinophils and Charcot-Leyden crystals. The occluding plugs were coughed up after bronchoscopy, and this was followed by recovery. The second patient was a 19-year-old youth who had had chronic eosinophilic bronchitis and attacks of asthma since childhood. Improvement occurred several times during sojourns in the mountains, but the last time this had had no effect. The upper 3 segments of the upper lobe of the left lung were found to be occluded. After bronchoscopy the patient coughed up much viscous sputum in which eosinophils and Charcot-Leyden crystals were found. This was followed by recovery.

The third patient was a 32-year-old woman in whom increasing occlusion of the upper lobe of the left lung was accompanied by severe clinical symptoms. Here again bronchoscopy was followed by improvement, and complete recovery followed the administration of prednisone. In this patient swelling of the bronchial mucosa and bronchospasm apparently played a part, and this was counteracted by prednisone. Bronchoscopy with removal of the secretion by suction and the subsequent coughing up of obstructing plugs is the first and most important part of the treatment. Roentgenoscopy is an important factor in the diagnosis of this form of bronchial occlusion. The symptoms vary in different patients.

Transient Atrial Fibrillation: A Frequent Occurrence in Apparently Normal Hearts. R. N. Class. U. S. Armed Forces M. J. **8**:1-13 (Jan.) 1957 [Washington, D. C.].

Transient atrial fibrillation was observed during a 30-month period in 16 military men between the ages of 17 and 35. No definite evidence of organic heart disease could be found in any. All of these patients, with the possible exception of 1 with anginal-type pain of 1 year's duration, fell into the category of patients described as having benign, idiopathic, functional, or uncomplicated atrial fibrillation. Atrial fibrillation is a physical diagnostic sign and not a disease per se. The most common causes of this arrhythmia, namely, rheumatic and arteriosclerotic heart disease, hyperthyroidism, hypertension, and coronary artery disease, must be ruled out. The attacks of arrhythmia may become progressive, with occasional establishment of permanent fibrillation in about 10% of the patients with functional transient atrial fibrillation. The remainder either have recurrent attacks fairly regularly or the attacks may become less frequent, of shorter duration, or may cease entirely, either spontaneously or with drug therapy. This arrhythmia in the absence of organic heart disease is benign and has an excellent prognosis. The ability of these patients to perform satisfactory military duty is not appreciably impaired.

The place of publication of the periodicals appears in brackets preceding each abstract.

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One-third of the patients had infrequent fibrillation of short duration and mild symptoms or none. They did not require definitive therapy. A rapid ventricular rate, particularly if over 150 per minute, is the most positive indication for definitive therapy with digitalis and/or quinidine. All patients should be thoroughly instructed as to the benign nature of this disorder and urged to eliminate precipitating factors. Maintenance therapy with quinidine is recommended for patients whose attacks become progressively more frequent and of longer duration and whose symptoms of an excessively rapid heart rate are pronounced.

Terramycin in the Therapy of Tetanus. U. Volterrani. Gazz. med. ital. **115**:400-404 (Dec.) 1956 (In Italian) [Turin, Italy].

Three men and 3 women aged 21 to 53 years with tetanus were treated with antitetanic serum, penicillin, and terramycin. The period of incubation was 4 to 15 days. Symptoms appeared suddenly in all patients. Temperature was very high in 4 patients and slightly elevated in 2. The pulse rate was rapid in all patients. The symptoms diminished 4 to 7 days after the therapy and disappeared after 10 to 15 days. A dose of 250 mg. of terramycin every 12 hours was given. The drug was well tolerated by all patients. An itching rash occurred in 1 patient, but it disappeared after 2 days. Sedatives were given with the antitoxic and antibiotic therapy. Terramycin has a bacteriostatic effect on Clostridium tetani.

Hypophysial-Diencephalic Regulatory Disturbances in Pulmonary Tuberculosis. H. Schelske and E. G. Ewaert. Ztschr. ges. inn. Med. **11**:1105-1115 (Dec. 15) 1956 (In German) [Leipzig, Germany].

Since secondary effects of the tuberculostatic drugs such as Amithiozone have been known to involve the incretory system, discussions about connections between tuberculosis and internal secretion have increased. Hormonal connections between the hypophysis and the adrenal cortex play a part in the course of all infections, and in tuberculosis several incretory relations have been suggested, such as that impairment of the adrenal cortex is a decisive factor in the unrestricted dissemination of tuberculosis; that hyperfunction of the anterior lobe of the hypophysis or a functional disturbance in the hypophysial-diencephalic system prepare the way for a progressive tuberculosis; and that tuberculosis can be grouped with the diseases of adaptation. There is likewise no doubt that tuberculosis influences the incretory system. Starting with the hypothesis that active tuberculosis is accompanied by a disturbance in the hypophysial-diencephalic regulatory system, the authors made tests on 25 unselected patients with active pulmonary tuberculosis. They describe the results of tests on the regulation of the water metabolism before and after chemotherapy. The demonstrated anomalies in diuresis (inhibition, molar dissociation, and multiphasic course of the diuresis) are interpreted as hypophysial-diencephalic disturbances.

Additional tests concerned chiefly with the adrenal cortex revealed the abnormal outcome before and normalization after treatment in severe forms of exudative tuberculosis. Anomalies in diuresis were corrected by the administration of cortisone and desoxycorticosterone acetate. The excretion of 17-ketosteroids was not noticeably reduced, and so it is believed that there was no primary damage to the incretory organ. This assumption is confirmed by the pathological outcome of the epinephrine leukocytosis as a brain-stem test. The absence of counter regulatory manifestations after the administration of insulin, as the only pathological factor detected by the combined investigation of the carbohydrate metabolism, also indicates a functional impairment of the diencephalic centers.

More Recently Isolated Viruses of Respiratory Tract (A. P. C. Virus Group): Review. K. B. Petersen. Ugesk. læger **118**:1483-1489 (Dec. 13) 1956 (In Danish) [Copenhagen].

The recently isolated adenoviruses can be grown in tissue culture cells from human embryos, in monkey kidney cells, and in cultures of human cancer cells. They share a common complement-fixing antigen, have similar biophysical characteristics and produce well-defined cytopathogenic changes in tissue cultures. Each type is neutralized only by homologous antiserum. Adenovirus types 3, 4, and 7 play an important role in certain acute febrile respiratory diseases. While there is much information as to the significance of these viruses in large and small epidemic outbreaks of respiratory diseases, what percentage of sporadic acute respiratory infections is due to them is not known. The usual chemotherapeutic and antibiotic agents are without effect. The etiological importance of types 1, 2, 5, and 6 is obscure. Most of the strains have been isolated by a demasking technique from lymphoid tissue. Type 8 has been isolated from patients with keratoconjunctivitis epidemica. At present, 17 strains are known. Association of human diseases with types 9 to 17 is being investigated.

Gastrointestinal Manifestations of Systemic Lupus Erythematosus. C. H. Brown, E. K. Shirey and J. R. Haserick. Gastroenterology **31**:649-666 (Dec.) 1956 [Baltimore].

Of 87 patients with systemic lupus erythematosus, 32 had such gastrointestinal symptoms as nausea and vomiting, flatulence, epigastric distress, diarrhea, abdominal tenderness, cramps, hematemesis, and pain in the right flank. In 25 these symptoms were mild, infrequent, and not a therapeutic problem. The remaining 7 patients, all women, had severe gastrointestinal symptoms that were among their predominant complaints and that constituted major problems in diagnosis and treatment. All 7 received steroid therapy after the diagnosis of lupus erythematosus was made. Five of them were considered to have an adynamic or paralytic ileus, which was confirmed by roentgenography in all and additionally by operation in 1. Three

of the 5 had dilatation of the 2nd and 3rd parts of the duodenum; one had a dilated, atonic stomach; and one had segmental dilatation of the jejunum. The ileus was temporary, and no obstructive lesion was found. Three of the 5 patients responded favorably to frequent feedings and administration of antacids. A perforated ulcer occurred in the 4th patient, who was not given ulcer treatment. The treatment of the ileus is medical. Ulcer therapy, consisting of frequent feedings and antacids, is indicated for these patients with duodenal stasis or a history of peptic ulcer who, in addition, should be given steroids. The 5th patient, who had a dilated jejunum, was subjected to jejunotomy with evacuation of food and food residue from the dilated jejunum and immediate closure of the wound. Collagen deposition in the submucosa, vascular changes associated with lupus erythematosus as the primary disease, or a localized neurogenic phenomenon offer the most likely explanations of the causation of the segmental, temporary ileus in these patients.

The remaining 2 patients had ulcerative colitis associated with their lupus. One of these, in addition, had severe liver disease manifested by jaundice, spider nevi, positive flocculation tests, and an increased prothrombin time that did not respond to vitamin K therapy. Ulcerative colitis has much in common with systemic lupus erythematosus. The absence of the homogenous ground substance, the vasculitis in some patients, and the systemic complications of chronic ulcerative colitis suggest that this disease may be a systemic or collagen disease similar to lupus erythematosus. Autopsies were performed on 11 of the 87 patients with lupus erythematosus. The gastrointestinal findings were normal in 9. Interstitial edema and submucosal hemorrhage of the small intestine were found in 1, and there was collagen deposition in the submucosa of the stomach in 1. These findings did not provide definite indications of the cause of the ileus in the 5 patients.

Essential Thrombopenia Treated with Corticotropin and Cortisone with Good Effect. S. B. Jensen. Ugesk. læger **118**:1525-1528 (Dec. 20) 1956 (In Danish) [Copenhagen].

The cause of essential thrombopenia is unknown. The most common assumption is that the disease is a syndrome in which, among other things, there is a disturbance in the autoimmune mechanism so that antisubstances for unknown reasons are formed with the patient's own blood platelets. The treatment formerly consisted in transfusions in the acute stage, awaiting spontaneous remission, which is not infrequent, or, if this did not occur, in splenectomy. Most authors agree that corticotropin and cortisone are at least temporarily effective in essential thrombopenia. The hormones often exert a favorable effect on the capillary fragility that is almost always present, while the effect on the platelet count is more irregular. Splenectomy often becomes necessary later, but most patients can quickly be brought into an operable condition. Routine application of corticotropin or cortisone preoperatively in essential thrombopenia is advised instead of waiting for spontaneous remission. In the case reported, in a woman aged 29, treatment with corticotropin and cortisone had a striking effect that continued after termination of the hormone treatment.

Functional Diarrhea: An Analysis of the Clinical and Roentgen Manifestations. M. H. Kalser, D. E. Zion and H. L. Bockus. Gastroenterology **31**:629-648 (Dec.) 1956 [Baltimore].

The clinical and roentgenologic features of 69 patients between the ages of 20 and 75 years with functional diarrhea were studied. Twenty-nine patients with functional gastrointestinal disease but without diarrhea served as controls. None of these patients had laboratory or roentgenographic evidence of organic gastrointestinal disease. Emotional factors were believed responsible for the diarrhea in 45 of the 69 patients. History suggested that the chronic diarrhea occurred as a sequel of acute infectious diarrhea in 7 patients, 4 of whom had had proved bacillary or amebic dysentery previously. Three patients dated the onset of diarrhea to abdominal surgery (cholecystectomy for cholelithiasis in 2 and a cesarean section in 1). Diarrhea appeared first in 3 patients while they were taking antibiotics; the symptoms persisted long after the antibiotic could have been active. Gastrointestinal allergy was believed to be the cause of the diarrhea in 2 patients, and the causative factor was not obvious in 9. Constipation alternated with diarrhea in 25 of the 69 patients. The diarrhea was continuous for many months in 8 patients and alternated with normal intestinal habits in 36 patients. Frequent concomitant symptoms included nausea and vomiting in 19 of the 69 patients and aerophagy (excessive belching, flatus, or borborygmi) in 49. Sixty-three of the 69 patients had abdominal pain, usually cramping in nature, located most often in the lower abdominal or periumbilical region. It was often relieved by defecation. Achlorhydria was present in 7 of 58 patients with diarrhea in whom the gastric behavior in response to an Ewald meal (2-hour fractional gastric analysis) was recorded. One of the 29 patients in the control group had achlorhydria. Evidence of nutritional deficiency was entirely absent.

Roentgenographic studies of the small intestine in the patients with functional diarrhea revealed a striking increase in the incidence of hypermotility (initial rapid transit rush) in 40. When present to an extreme degree, this is almost pathognomonic of psychogenic diarrhea. Coarsening of the jejunal mucosa was noted in 16 of the 69 patients. The ileum showed evidences of motor dysfunction more frequently than did the jejunum: hypertonicity was observed in 39 patients, "stacked coin" appearance in 17, and abnormal segmentation in 8. Roentgenographic signs of irritability of the colon were present in 40 of the 59 patients with diarrhea and in 19 of the 25 control patients in whom a barium enema was available for review.

A definite diagnosis of functional diarrhea cannot be made until appropriate laboratory and roentgenographic studies have eliminated the likelihood of organic disease. Often the diagnosis of functional

diarrhea will be justified by the following observations: the absence of objective evidence of organic or constitutional disease, absence of nutritional deficiency, presence of emotional instability or emotional trauma, and signs of irritability and often of hypermotility of the small intestine by barium meal study.

Osteitis Deformans. Ø. Skjæggestad. Tidsskr. norske lægefor. **76**:932-934 (Dec. 1) 1956 (In Norwegian) [Oslo].

Osteitis deformans is often mistakenly diagnosed or overlooked. It rarely occurs before the age of 40 years. There seems to be a familial predisposition. The etiology is unknown. Cranium, pelvis, vertebrae, tibia, and femur are the bones most often affected. There is at first a resorption of the normal bone tissue, which is supplanted by abundantly vascularized connective tissue. Bone neoformation soon follows, usually exceeding the destruction, which continues. A thickening of the bone occurs, and the bone becomes mechanically inferior. Stress and strain accelerate bony neoformation. When the patient is confined to bed the bone destruction is the determining factor, with increased calcium and phosphorus values in the blood. Osteoblast activity, which increases on exercise, is accompanied by an increased alkaline phosphatase level. The monostotic form is as a rule without symptoms and is discovered accidentally. The polyostotic form causes localized or diffuse pain. Often, enlargement of the head brings the patient to the physician. Due to bowed legs and affection of the spine, the patient may lose height. The skin temperature may be increased over the affected parts. In advanced cases, the roentgenographic findings are typical. Treatment consists in exercise. Roentgenotherapy is without effect, and administration of increased amounts of vitamins D and C has been of no avail. Within a short period, 4 cases of osteitis deformans, all more or less accidentally discovered, were treated in Ullevål Hospital. The disease is presumably more common than generally supposed. Roentgenography and estimation of the alkaline phosphatase level provide the best means of diagnosis. The disease may be the cause of backache in old persons. If the patient is bedridden, a diet low in calcium is advised; if he is up, additional calcium is required.

Leukemia in Oslo, 1946 through 1950: A Statistical Study. K. O. Husebye and V. T. Gaustad. Acta med. scandinav. **156**:183-192 (No. 3) 1956 (In English) [Stockholm].

Death registrations and hospital files in Oslo for the 5-year period from 1946 to 1950 were checked, and 130 patients with an unequivocal diagnosis of leukemia leading to death in the same period were found. Sufficient clinical information was lacking in 8 of the 130 patients, and further studies were therefore limited to 122 patients. The total number of deaths from leukemia averaged about 26 per year, giving an over-all death rate of 6.1 per 100,000 population (7.3 for males and 5.1 for females). The annual death rate for leukemia decreased from 4.4 deaths per 100,000 population in the 1st decade of life to 0.9 in the 3rd decade. Thereafter, a rapid increase to 36.1 in the 8th decade was observed, indicative of an ever-increasing death rate for leukemia with advancing age.

Seventy-seven (63%) of the 122 patients had acute leukemia, 25 (21%) had chronic granulocytic leukemia, and 20 (16%) had chronic lymphocytic leukemia. The over-all mortality rate of patients with acute leukemia was 3.6 per 100,000 population (3.1 for males and 4 for females). The death rate dropped from a high of 4 in the 1st decade to 0.5 in the 3rd decade. From then on, a gradual increase to 20.6 in age groups 70 to 79 years was noted. The predominance of female patients was not statistically significant. The mortality rate of patients with chronic granulocytic leukemia was 1.2 (1.8 for males and 0.6 for females). The rate increased gradually from a low in the 3rd decade to 4.6 in the 8th decade, and a predominance of male patients was noted. The mortality rate of patients with chronic lymphocytic leukemia was 0.9 (1.6 for males and 0.3 for females). No patients were less than 60 years of age, and a steady increase in death rate to 13.6 among patients over 80 years of age was noted. Eighty per cent of the patients were males.

The relative importance of leukemia as a cause of death depends on the absolute number of deaths from leukemia and on the total number of deaths in the age groups in question. Leukemia accounted for 1.3% of all deaths in the 1st decade of life (up to 10% of the deaths in children between the ages of 3 and 4 years), 6.7% in the 2nd decade, and from then on about 1% of all deaths, until a rapid drop was noted after the age of 70 years.

Leukemia in Oslo, 1946 through 1950: A Clinicopathologic Study. K. O. Husebye and V. T. Gaustad. Acta. med. scandinav. **156**:193-204 (No. 3) 1956 (In English) [Stockholm].

The clinical and pathological features of 122 patients who died of leukemia in Oslo between 1946 and 1950 are reported. Seventy-seven patients had acute leukemia, 25 chronic granulocytic anemia, and 20 chronic lymphocytic leukemia. The 77 patients with acute leukemia were treated with antibiotics, chemotherapeutics, and blood transfusions but did not receive specific treatment with folic acid antagonists and steroids. With the exception of 2 patients with monocytic leukemia with a protracted course, the disease took a rather rapid course in 75, and only 20 (27%) were alive 3 months after onset of the first symptom; 3 patients (4%) were alive after 6 months. The clinical picture did not differ from that reported by other workers. Enlargement of liver, spleen, or lymph nodes was found in only one-fifth or less of the patients on admission to hospital; such enlargements were noted later in the course of the disease in one-third of the patients. A state of "aleukemia," with less than 10,000 white blood cells per cubic millimeter of blood, was observed at some time or another in 43 (55%) of the 77 patients and through the entire course of the disease in 29 (38%).

The duration of the disease varied from 6 weeks to 194 months, with an average of about 10 months, in the 25 patients with chronic granulocytic leukemia. Seven of these patients (28%) survived for 2 years or more, and 1 patient (4%) survived for 5 years. Moderate enlargement of lymph nodes was observed in 8 patients, and liver and spleen were not enlarged in 6 patients with chronic granulocytic leukemia. An "aleukemic state" was observed at some time in 12 patients (48%) of this group; repeated examinations revealed more than 10,000 white blood cells per cubic millimeter of blood in 19 patients (76%). Chronic lymphocytic leukemia was diagnosed accidentally or at the onset of the first symptoms in 6 of the 20 patients with this form of the disease. The duration of the disease varied from one week to 167 months, with an average of about 4½ months, in the remaining 14 patients. Eight patients (40% of the 20) survived for 2 years or more; 3 patients (15%) survived for 5 years. The absence of clinical enlargement of lymph nodes in 5 patients and of liver or spleen in 10 during the entire course of the disease has been emphasized. Initially, only 2 of the 20 patients had less than 10,000 white blood cells per cubic millimeter of blood, but the leukocyte counts were considerably elevated on repeated examinations later in the course of the disease in all patients.

SURGERY

Suffocative Goiter in the Newborn. J. C. Handelsman and H. Sussman. Ann. Surg. **145**:108-114 (Jan.) 1957 [Philadelphia].

A 2-day-old male child was admitted to the Sinai Hospital in Baltimore because of a large mass that occupied the position of the infantile thyroid. He showed evidence of respiratory difficulty, especially during feeding. This was relieved only by marked hyperextension of the neck. The mother had had an uncomplicated pregnancy. There was no history of thyroid disease in the family, nor was there a record of iodine or propylthiouracil administration to the mother. The respiratory difficulties became progressively more severe, and, on the 6th day of life, it became apparent that surgical intervention was necessary. At this time, 6 drops of Lugol's solution had been given over a 2-day period. A partial thyroidectomy was carried out under endotracheal ether-oxygen anesthesia, with the isthmus and the anteromedial portion of both lobes removed. Some 11.1 Gm. of tissue was removed, which proved microscopically to be nontoxic hyperplasia. Because the infant's facies suggested the possibility of cretinism and roentgenograms suggested a delay in osseous development, it was decided to administer desiccated thyroid, first 32 and then 48 mg. daily. The gland steadily diminished in size, and the child's convalescence was thereafter uneventful.

The authors collected 6 similar cases from the American literature. The children ranged in age from 15 hours to 13 months. Resection, rather than tracheotomy or irradiation, is the surgical procedure of choice in the face of respiratory distress. Reports of goiter in newborn infants appear in increasing numbers. The administration of thiourea derivatives to thyrotoxic pregnant women seems to be the principal cause for this rising rate, but sporadic cases of congenital goiter continue to appear as well. Suffocation from congenital goiter emphasizes that prompt surgical intervention may save the life of the child.

The Solitary Pulmonary Nodule. J. W. Peabody Jr., E. W. Davis and S. Katz. M. Ann. District of Columbia **26**:1-7 (Jan.) 1957 [Washington, D. C.].

The problem presented by the solitary pulmonary nodule referred to by the laity as a "spot on the lung" and in the medical literature inappropriately as a "coin lesion" is becoming more urgent since the more liberal use of routine and survey roentgenograms of the chest. The observations presented in this paper are based on 215 cases that met radiographic criteria laid down in a previous report. Nearly half (101 of 215 lesions) proved to be malignant. Ten of these proved to be metastatic, but the remaining 91 patients (42% of the total) had primary pulmonary neoplasms. Nine were bronchial adenomas, which, in keeping with their malignant propensities, were classified with the malignant tumors. The remainder included 79 bronchogenic carcinomas, 1 fibrosarcoma, 1 leiomyosarcoma, and 1 lymphoblastoma. Of the benign nodules, more than two-thirds were granulomas. Wherever possible, the tissue blocks from these patients were sectioned and studied by Ziehl-Neelsen, periodic acid-Schiff, and Gridley stains. In this way, it has been possible to establish a specific cause in 80% of the cases. Histoplasmas were demonstrated in 40 lesions, Coccidioides in 5, and tubercle bacilli in 12. No organisms could be identified in 12 cases, and these were labeled nonspecific. Tissue was no longer available in 15 cases, and these were classified simply as granulomas. The series included 17 patients with benign tumors, 9 of which were hamartomas, 6 were pleural mesotheliomas, and 2 were neurofibromas.

The patients under 40 years of age had 12 malignant tumors and 27 benign nodules. Thus, the chance of a pulmonary nodule being malignant is almost 1 in 3. In the 40-to-49-year age group the incidence of carcinoma was practically 50%, and this was even higher in the older age groups. In other words, regardless of the patient's age, the chance of malignancy remains high. Likewise, the patient's sex, the size and location of the nodule, or the presence or absence of symptoms gave no sure clue to diagnosis. There exists no reliable clinical, laboratory, or radiographic means, unless it be the presence of calcification, for differentiating between the benign and malignant nodule. Thoracotomy is mandatory. For those with bronchial carcinoma the absence of symptoms and promptness of operation are apt to determine the possibility of cure. The authors gained the impression that any patient with a small solitary circumscribed asymptomatic bronchial carcinoma picked up in a routine chest roentgenogram has a good chance for complete cure if operated on promptly. Thirty-two of the patients reviewed here were in this category, and 24 of these survived in apparent

good health. Of this group, 14 were operated on over 5 years ago, and 11 were alive and well when last seen. Although the number of cases quoted is too small to assume statistical significance, it suggests that the 5-year survival rate in bronchial carcinoma so situated and so treated approaches 75%.

Primary Bronchial Tumors: Study of Material of 332 Cases. C. Capellen Jr. and E. Poppe. Tidsskr. norske lægefor. **76**:998-1002 (Dec. 15) 1956 (In Norwegian) [Oslo].

The 332 cases of primary bronchial tumor, in 271 males and 61 females, here considered consist of 128 flat epithelial carcinomas, 74 slightly differentiated carcinomas, 33 adenocarcinomas, 9 bronchiolar carcinomas, 31 adenomas, 9 salivary gland tumors, and 48 unclassified forms. Flat epithelial carcinomas and the slightly differentiated forms occurred and almost exclusively in men; the other types were fairly evenly distributed between the sexes. The frequency of carcinomas begins to increase from the age of 40 on; most cases occur between 40 and 70. Adenomas and salivary gland tumors can cause symptoms as early as in the 1st years of life and are fairly evenly distributed in the middle and higher age groups. The first patient in the series to be operated on was a 12-year-old boy, with adenoma in the left bronchus, on whom a lobectomy was performed. Cough is usually the first symptom. Other early symptoms are dyspnea, thoracic pain, hemoptysis, "pneumonia," and general symptoms. Hemoptysis, however, was the first symptom of many adenomas and salivary gland tumors. A pulmonary abscess without known cause in a middle-aged or older person may depend on a bronchial tumor. Most flat epithelial carcinomas, undifferentiated carcinomas, and adenomas caused symptoms for a year or less before the diagnosis was made. In about half the patients with adenomas and salivary gland tumors there had been symptoms for over 2 years before the diagnosis was made. Tumors may be present for a longer time without causing symptoms.

Diagnostic aids were the usual clinical examination, roentgenography, bronchoscopy with biopsy, and aspiration of bronchial secretion for cytologic examination, which has come to play an increasingly important part. For technically operable bronchial tumors, radical excision is the treatment of choice. A sedimentation rate of less than 20 mm. is a good prognostic sign. Of 65 patients with flat epithelial carcinomas operated on radically, 23 were living and free from recurrence after at least 3 years. No patient with clinically or roentgenologically demonstrable distant metastases were operated on. Patients with established tumor metastases in the lymphnodes in the fossa clavicularis were regarded as inoperable. A pleural exudate is in itself not a contraindication because it may be due to secondary inflammation. Patients with demonstrable tumor cells in the pleural exudate are inoperable. Paralysis of the recurrent laryngeal nerve is presumably a sign of inoperability; none of the patients with this symptom survived the first 2 years after operation. Classification of the histological type is of great value. Radical operation has given encouraging results in adenomas, salivary gland tumors, and in flat epithelial carcinomas. The results of operation on the slightly differentiated forms and adenocarcinomas are not good. The slightly differentiated forms are often highly radiosensitive, and combined surgical and radiological treatment may improve the results in patients with tumors of this type.

Cancer of the Lung in Northern Ireland. T. B. Smiley and E. A. Cheeseman. Ulster M.J. **25**:62-74 (Nov.) 1956 [Belfast, Ireland].

The records of 404 patients in whom carcinoma of the lung was diagnosed between 1950 and 1954 were examined in respect of age, sex, first symptom, histology, surgical treatment, operative mortality, and survival. In men, the most frequent first symptom was pain in the chest (23.5%), closely followed by cough (20.7%). In women the most common was cough (26.2%). The other important first symptoms were "influenza," shortness of breath, and hemoptysis. The average age at which these symptoms appeared was 56 years but ranged from 29 to 81 years. Histological examination showed that 124 tumors were squamous, 10 adenocarcinoma, and 77 undifferentiated. The remaining 193 were unclassified, but most were thought to be of the undifferentiated type. There was evidence that when hemoptysis, "influenza," and cough appear as first symptoms the tumor is more likely to be squamous but when shortness of breath and pain in the chest appear first the tumor is more likely to be undifferentiated.

One hundred forty-three of the 404 patients were operated on, and 91 (or 64%) of these had resections. On the average resection was performed about 8 months after the appearance of the first symptom. The male patients on whom operations were performed were younger, on the average, than those not operated on by 3 or 4 years. Histology appears to be an important factor determining the resection rate. Of patients with squamous carcinoma and adenocarcinoma, significantly more had resections (50.8 and 70%, respectively) than did those with undifferentiated tumors (22.1%). Of the 91 resections, 3 were followed by death within 1 month and 14 within 3 months. Using life table methods and considering only the 88 patients alive at the end of 1 month after operation, the chances of survival were estimated at 49% at the end of the 1st year and 37% at the end of the 2nd; thereafter, no mortality was observed, and the estimated survival for the next 3 years was 35%. Patients with squamous tumors had better survival rates than others; 54% survived to the end of one year compared with 24% for patients with undifferentiated tumors. The rates at the end of 2 years were 41% and 12% respectively.

Intrathoracic Emergencies in the Aged. D. Carr. Geriatrics **12**:1-6 (Jan.) 1957 [Minneapolis].

Disabilities as the result of degenerative processes usually come on gradually, but acute, life-threatening conditions may occur. These can be easily cor-

rected if their true nature is recognized. The author reports on patients, aged from 56 to 81, with acute esophageal obstruction, diaphragmatic hiatal hernia, spontaneous pneumothorax, and simulated coronary occlusion. Esophageal obstruction is caused by a bolus too large to pass a partial obstruction, which may be caused by carcinoma, benign tumor, achalasia, or diverticulum of the esophagus. Acute obstruction can usually be relieved by digestants, such as Caroid powder. The cause of the obstruction should be removed after the acute episode has passed. A known esophageal diverticulum should be repaired while the patient is in good condition. This will prevent spill-over into the lungs and consequent chronic pneumonitis.

Diaphragmatic hernia with recurring symptoms may result in acute obstruction. Operation should be performed before this occurs, if possible. Spontaneous pneumothorax may present a severe emergency when it occurs in elderly emphysematous patients. Detection by physical examination is difficult, since the breath sounds are distant and faint. Roentgenographic recognition is important, so that the partially collapsed lung may promptly be reexpanded. The clinical findings of acute coronary thrombosis are similar to those of spontaneous pneumothorax on the left and to those of diaphragmatic hernia. The importance of an exact diagnosis is emphasized, since death may ensue, if only the heart is treated. Partial enterocele is most frequent in older patients and dangerous, for strangulation may occur rapidly without obstruction. Operation should not be delayed. Some partial enteroceles with obvious symptoms are promptly repaired with good results. Operation may consist of herniorrhaphy, plication, inversion of a small strangulated patch, or segmental resection and end-to-end anastomosis.

Treatment of Cushing's Disease by Pituitary Surgery: Report of Two Cases. R. Luft, H. Olivecrona, D. Ikkos and C. A. Hernberg. Acta endocrinol. **25**:1-7 (Jan.) 1957 (In English) [Copenhagen].

The 1st of the 2 patients with Cushing's disease was a woman who had had manifestations of Cushing's syndrome in 1942, at the age of 15. At that time, the adrenals had been found to be normal by roentgenologic examination and by laparotomy. Two courses of x-ray irradiation to the hypophysis were given in July and November, 1943 (1,500 r in each). Rapid improvement followed, and the syndrome remained in remission until the spring of 1948, when it reappeared and progressed. X-ray treatment of the hypophysis in September, 1948, induced only slight temporary improvement. Similar treatment in April, 1950, with 4,500 r was without effect. At examination in May 1951 she presented a typical Cushing's syndrome. Electrocoagulation of the pituitary was performed on June 26 and July 6, 1951. Substitution therapy was not given. A rapid subjective and objective improvement was noticed postoperatively. Menstruation reappeared 3 weeks after the second operation, and the patient became pregnant in August, 1952. During the last 3 years she had been in perfect health.

In the 2nd patient, signs of Cushing's syndrome began in 1951 when he was 17 years old. Examination of this youth in June, 1952, showed moon face, typical obesity with a cervicodorsal fat pad, purple striae, decreased dextrose tolerance, and eosinopenia. The excretion of 17-ketosteroids was 19.2 mg. and of corticoids 2.1 mg. (normal value less than 1 mg.) in 24 hours. Subtotal adrenalectomy was performed on July 3 and September 15, 1952. Remnants of the enlarged adrenals were left behind. The excised portions of the adrenals weighed 18 and 19.5 Gm. respectively. Cushing's syndrome disappeared postoperatively, and there was remission for about 2 years. Signs of adrenocortical hyperfunction reappeared in September, 1954, and in December the patient again showed signs of Cushing's syndrome. Hypophysectomy was carried out in April, 1955, by a frontotemporal approach. The patient was given no adrenocortical hormones before the operation, but a few hours after the operation the blood pressure showed such a decided drop that substitution therapy in the form of cortisone and desoxycorticosterone was started. When reexamined in September of the same year, the patient was free from symptoms, except for decreased libido and reduced growth of facial hair. In May, 1956, his appearance was that of a normal man.

It is assumed that in the 1st patient a pituitary adenoma was destroyed by the electrocoagulation. In the 2nd patient, hypophysectomy was apparently complete, and the disappearance of Cushing's syndrome in this patient should be attributed to the elimination of the pituitary function. The question whether Cushing's disease is of pituitary or adrenocortical origin has been widely discussed. The authors believe that the result in their 1st patient suggests that the Cushing's disease was of pituitary origin. As for the 2nd patient, no statement is possible. Nevertheless, the results in this case demonstrate that hypophysectomy should be considered in patients with Cushing's disease in whom adrenocortical surgery is undesirable or ineffective.

Metabolic Response to Adrenalectomy. R. P. Jepson, A. Jordan, M. J. Levell and G. M. Wilson. Ann. Surg. **145**:1-11 (Jan.) 1957 [Philadelphia].

Jepson and associates investigated the gain or loss in terms of electrolytes, nitrogen, and water of 8 women undergoing bilateral adrenalectomy and oophorectomy and maintained on a constant dose of cortisone. The operation, which was performed in 1 or 2 stages, inflicted considerable operative stress and at the same time was thought to remove any internal source of adrenocortical steroids. The 8 women had advanced mammary carcinoma. The ages of the women ranged from 30 to 58 years. All had widespread soft tissue and often bony metastases after a previous radical mastectomy for mammary carcinoma.

The results of the serum sodium, potassium, and chloride estimations are shown in a table. The preoperative levels fell within the normal range, with the exception of one patient who had a low serum sodium level. After operation, the general trend was for the serum sodium and chloride levels to fall slightly. This fall in serum sodium and chloride levels was of a degree similar to that associated with operations of a comparable magnitude in "normal" patients. The serum potassium readings did not show any constant postoperative changes. The patients remained in positive fluid balance throughout the study, showing a moderate oliguria in the immediate postoperative period with a return to larger urinary volumes toward the 3rd or 4th postoperative day. As intravenous and oral intake were not excessive, the postoperative diuresis that often succeeds the oliguric period was not to be expected and indeed failed to occur. The preoperative ketogenic steroid excretion varied according to the amount of cortisone administered. The postoperative metabolic behavior of these patients appeared to fall within the normal pattern, nor could any quantitative relationship be found between the magnitude of the metabolic response and the level of steroid excretion. It is concluded that the normal pattern of metabolic response may be initiated, maintained, and terminated without any variation in the adrenocortical steroid level.

Gastrojejunal Syndrome Following Gastroenterostomy and Gastric Resection: Report on 46 Reoperations. G. Noli and G. Tusini. Chir. e pat. sper. **4**:1300-1315 (Nov.) 1956 (In Italian) [Milan, Italy].

In a group of 46 patients who underwent reoperation because of the reappearance or the persistence of gastrojejunal disturbances, 18 had first had a gastroenterostomy and 28 a gastric resection. Cancer of the neostoma was present in 2 patients. All patients had perivisceritis. Ulcers were present in 8 of the patients who underwent gastroenterostomy (6 had postoperative peptic ulcers) and in 6 who underwent gastrectomy. Because the authors believe that partial resection combined with isoperistaltic gastrojejunostomy favors the occurrence of gastrojejunal inflammatory lesions, they advise antiperistaltic gastrojejunostomy.

Pain in the Lower Limb After Sympathectomy. G. D. Tracy and F. B. Cockett. Lancet **1**:12-14 (Jan. 5) 1957 [London].

Sympathectomy has come to occupy an established place in the treatment of certain vascular disorders of the lower limb. Beneficial effects include particularly increased blood flow, better skin nutrition, and a decrease in response to cold. Complications have also been noted. These include troublesome dryness of the skin in the area affected by the operation, excessive sweating above it, and pain. The problem of postsympathectomy pain was studied after 51 lumbar sympathectomies carried out in the course of 1 year on 42 patients. Pain after operation was observed in 9 extremities in 7 of the 42 patients. The clinical features were remarkably similar in each of the 7 patients. The most constant feature was a latent period until the 10th to the 17th postoperative day, when the pain appeared. By this time the patients had all been discharged from hospital. The onset was sudden, the pain becoming severe and unremitting in some patients and always worse at night. In each patient the pain was limited to the anterior parts of the thigh down to the knee, corresponded closely to the distribution of the 1st and 2nd lumbar dermatomes, and was associated with marked hyperesthesia. Some patients had sleepless nights for as long as 3 weeks, after which the pain usually began to abate.

Physical examination revealed hyperesthesia to light touch in the affected areas, with cool, moist skin but with no sensory loss or other evidence of somatic nerve damage. Spontaneous remission occurred in all but 1 patient. One patient whose pain was severe had relief overnight after 17 days. With the others the pain subsided more gradually, taking from 10 to 16 weeks to disappear. In 1 patient the pain is still present, though less severe, after 5½ months. None of the reasons previously suggested for this pain seem adequate. The following factors appear to be significant: The syndrome seems to be peculiar to sympathectomy and is not seen after other operations in which somatic nerves may be injured. The pain is distributed to the front of the thigh in the first two lumbar dermatomes. Residual sympathetic activity is always found in this area after a lumbar sympathectomy. This is possibly due to the presence of accessory sympathetic ganglions. Greatly increased sweating was discovered in the area of distribution of the pain, and the authors suggest that this could be significant.

Postirradiation Fractures of the Neck of the Femur. W. H. Stephenson and B. Cohen. J. Bone & Joint Surg. **38B**:830-845 (Nov.) 1956 [London].

The authors describe observations on 21 postirradiation fractures of the femoral neck in 17 patients who had received irradiations for carcinoma of the uterus. Those with carcinoma of the cervix uteri had been treated by radium insertions and deep x-ray therapy. Those with carcinoma of the uterine body had been treated by hysterectomy followed by deep x-ray therapy, with the exception of one patient, in whom the tumor was deemed inoperable and deep x-ray therapy was supplemented by the implantation of radon seeds. The x-ray therapy was administered originally by a 6-field technique that included direct lateral fields, the total skin dose being 3,000 r for each field. In later cases this was modified to a 4-field technique, with the omission of lateral fields, the skin dose being 3,000 r as before. In one instance, the fracture was incorrectly attributed to a metastasis in the femoral neck and was subjected to a course of direct irradiation. The fractures were all of the subcapital type. The material available for histological study was obtained from 2 patients who came to

autopsy and from 1 who was subjected to arthroplasty. There is evidence that the fracture is preceded by loss of trabecular bulk. Osteoporosis is a prominent feature. Destruction of cellular elements of the osseous tissue, as well as fatty change within the marrow, occur constantly. Obliteration of the blood supply is not responsible for the bone changes, because fracture was followed by a repair response that would not have been possible had the blood supply been materially impaired.

Most patients complain of pain that precedes by several weeks or months any evidence, either clinical or radiological, of actual fracture. An interval ranging from 18 months to over 9 years elapsed between irradiation and the onset of this pain. The pain may be located in the hip, be referred to the knee, or even take the form of sciatica. When the fracture is spontaneous, follows trivial trauma, or is heralded by an acute exacerbation of the premonitory pain, the physical findings are those of any new adduction fracture of the neck of the femur. The amount of displacement is variable. Healing of the fracture is frequently associated with sclerosis at the fracture site and in the adjacent bone, a finding that contrasts with the radiographic appearance of a simple healed fracture of the femoral neck. The methods of treatment are the same as those for simple fractures of the femoral neck, but the problem is complicated by additional factors. Initially the diagnosis cannot always be made with certainty. The fracture may have been present for some time before the patient comes under surgical care. Healing then may already be progressing, usually with a coxa vara that is irreducible by closed methods. The life expectancy of the elderly patients is reduced by the presence of malignant disease, and the prognosis of the malignancy has to be taken into consideration when deciding on the management of the hip lesion.

NEUROLOGY & PSYCHIATRY

Epidemic (Arthropod-Borne Viral) Encephalitis in Indiana. A. L. Marshall Jr. J. Indiana M. A. **50**:38-42 (Jan.) 1957 [Indianapolis].

The term "encephalitis" in medical literature is loosely used to cover both encephalitis and encephalomyelitis. "Brain fever and/or sleeping sickness" are popular terms for this illness. Four types of "epidemic encephalitis" have been noted in the United States. These are von Economo's disease (encephalitis lethargica or Japanese A encephalitis), eastern and western equine encephalomyelitis, and St. Louis encephalitis. Evidence has been produced that the equine forms of encephalomyelitis and St. Louis encephalitis are of viral origin and are transmitted by mosquitoes, mites or ticks; the name "arthropod-borne virus encephalitides" has been suggested for this group. The author describes an outbreak of encephalitis that began in September, 1955. Reports to the Indiana State Board of Health indicated that 11 cases of encephalitis of unknown cause, but thought to be primary virus infections, had occurred in the vicinity of Fort Branch, Gibson County, Indiana. At the time of the report, 3 of the patients had died and 3 others were critically ill. Case histories of the patients revealed that there had been an unusually large number of mosquitoes and also the arrival of large flocks of migrant birds, presumably starlings, prior to each wave of cases, which continued to be reported from an ever-widening area.

Altogether 96 cases were reported, but some of these occurred in the neighboring states of Kentucky and Illinois. Of 80 patients in Indiana who could be investigated, 59 had classic symptoms of encephalitis. Positive complement-fixation tests were obtained in 36 of the 59 patients. Thirteen of the 59 patients died. Between Jan. 1 and Nov. 15, 1956, a total of 69 cases of encephalitis were reported in Indiana. Kentucky has had 101 cases of St. Louis encephalitis (with 10 deaths) in the region of Louisville. It appears from observations in Indiana, Illinois, and Kentucky in 1955 and in 1956 that there is a reservoir of the virus of St. Louis encephalitis in some species of birds in the Ohio River Valley. Practitioners of this region should suspect St. Louis encephalitis whenever mosquitoes as vectors are numerous and cases of encephalitis occur in August, September, and early October.

Carotico-Vertebral Stenosis. E. C. Hutchinson and P. O. Yates. Lancet **1**:2-8 (Jan. 5) 1957 [London].

The recognition of the frequency and significance of occulsion of the cervical portion of the carotid artery has been a major advance in the study of cerebrovascular disease. Atheroma in this site has been suggested as a reasonable pathological explanation for the many cases of cerebral infarction that have been known to occur without occlusion of the intracranial vessels. The authors, like others, have observed that occlusion of the carotid artery may be present without symptoms, signs, or infarction of the brain; that it may be the basis of clinical findings identical in every way with thrombosis of the middle cerebral artery; and, finally, that it may be present when the clinical findings suggest a steadily progressive intracranial lesion presenting perhaps with dementia, intermittent sensory and motor phenomena, or visual disturbance—findings often indistinguishable from those caused by a cerebral tumor. It is hard, however, to believe that such a wide clinical spectrum should depend solely on occlusion of one or even both carotid arteries. The authors therefore investigated the major collateral channels—the vertebral arteries and the circle of Willis—in patients with carotid-artery occlusion in an effort to find an explanation for some of the discrepancies between the clinical and the pathological findings.

The cerebrovascular tree, including the whole length of the vertebral and carotid arteries, was examined in 83 patients considered to have died of cerebrovascular disease. To examine the cerebrovascular tree thoroughly, the brain was injected at autopsy with radiopaque gelatin through the carotid and vertebral arteries at a pressure approximating to the systolic blood pressure during life. The brain was

then removed and fixed in formalin. In the first 58 patients the vertebral artery was then dissected from the vertebral canal, but, since this method was too time-consuming for routine use, the cervical spine was removed with the carotid and the vertebral arteries in situ in the last 35 autopsies. In 40 of the patients examined there was either significant stenosis or occlusion of one or more of the major vessels in the neck. Of these, 10 had lesions of the carotid artery alone and 7 of the vertebral artery alone; in 23 (more than half the total) the lesions involved both the carotid and the vertebral arteries. The pathological basis for the stenosis was always atheroma, with the occasional addition of either old or recent thrombosis. A not uncommon finding was hemorrhage into the base of the plaques of atheroma. These hemorrhages, by dissecting the base of the plaque, had obviously caused further sudden narrowing of the lumen of the artery.

Stenosis of the cervical portion of the vertebral arteries plays an important part in the clinical findings previously attributed to occlusion of the internal carotid arteries. The term "caroticovertebral stenosis" is suggested as a more appropriate name for this syndrome. A surprising severity of disease of the extracranial, in contrast to the intracranial, cerebral arteries was noted in many patients. The hope is expressed that, by the early clinical recognition of such cases, surgical replacement of diseased segments of the internal carotid arteries might, by improving the total blood flow to the brain, prove useful.

Trial of Reserpine in Treatment of Schizophrenia. J. N. P. Moore and E. A. Martin. Brit. M. J. 1:8-14 (Jan. 5) 1957 [London].

One hundred nineteen patients with schizophrenia were treated with reserpine (Serpasil) in St. Patrick's Hospital in Dublin, Ireland. Twenty-two (group 1) were chronic deteriorated patients with an average stay of 13.5 years in the hospital; 38 (group 2) had a chronic illness of more recent origin than that of the patients in group 1 and had been treated previously by electroshock, insulin coma, leukotomy, and intravenous administration of acetylcholine; 17 (group 3) had been admitted recently to the hospital and were considered unsuitable for insulin treatment because of a long history, insidious onset, or lack of florid features; 21 (group 4) had schizoaffective psychosis with predominantly manic or depressive features associated with auditory hallucinations or paranoid delusions; 21 (group 5) had acute schizophrenia of less than 1 year's duration with symptoms of an active process. The patients in group 1 were the first to be treated with reserpine and were given 2 to 8 mg. of the drug by mouth daily for an average period of 75 days. The patients in the other groups were given 3 mg. by mouth daily throughout; 5 mg. intramuscularly on the first evening; and 10 mg. intramuscularly every night for 3 to 7 weeks, reducing this dose to 5 mg. on alternate nights for 2 weeks, and finally to 2.5 mg. on alternate nights before discontinuing the injections. The intramuscular dose was continued as a maintenance dose every 2nd or 3rd night indefinitely in the most severely and chronically ill patients. Each patient was treated individually and the dose was modified according to the side-effects and the mental state. The patients were followed up for periods of from a few weeks to 10 months.

Twelve of the 22 patients in group 1 were improved. Ten of them relapsed, and of these 2 failed to improve on a second course of reserpine. Seventeen of the 38 patients in group 2 were much improved, 10 were improved, and 11 were therapeutic failures. Nine of the 17 patients in group 3 were much improved, 6 were improved, and 2 were therapeutic failures. Fourteen of the 21 patients in group 4 were depressed and 7 were manic; 5 of the 14 were much improved, 1 was improved, and 8 were therapeutic failures; 5 of the 7 were much improved, 1 was improved, and 1 was a therapeutic failure. Eighteen of the 21 patients in group 5 were much improved and 3 were improved. These data suggest that chronic schizophrenics who have failed to achieve a sustained remission after electroshock therapy, insulin coma, or leukotomy may improve with intensive reserpine therapy. No schizophrenic patient should have a leukotomy without first having a prolonged trial on reserpine. Patients with schizophrenia of insidious onset but without florid symptoms or gross personality deterioration may respond favorably to intensive reserpine therapy. It is probably necessary to continue on an oral maintenance dose for a prolonged period. Immediate results of reserpine therapy in acute schizophrenics are impressive, but observation over a prolonged period alone can determine whether in these early cases it is a better therapeutic agent than insulin coma.

Severe depression of the endogenous type with characteristic early morning waking and suicidal preoccupation was the most serious complication of the treatment. The incidence of this complication was greatest in the schizoaffective type of psychosis. A history of endogenous depression is a contraindication to the use of the drug. Some chronic schizophrenics improved on oral dosage only. Intensive and prolonged treatment seems necessary in most patients with progressive schizophrenia. Most patients receiving reserpine eat better and put on weight. Anorexia nervosa may improve rapidly during therapy. The extensive use of reserpine markedly alters the character of a psychiatric unit. Negativistic, aggressive behavior is greatly diminished. Patients can enjoy more freedom and take a more active part in the hospital routine. It places an increased demand on the hospital staff for individual psychotherapy. The authors state, in an addendum, that at present the usual maximum dose of reserpine is 3 mg. orally and 5 mg. intramuscularly every day.

Focal Epilepsy: Surgical Findings in 43 Selected Patients and Reports on six Cases of Special Interest. R. L. Drake, J. S. Hibbard and L. Vin Zant. J. Kansas M. Soc. 58:1-7 (Jan.) 1957 [Topeka].

The authors show that the use of newer techniques has brought about newer concepts and a more practical classification of the various forms of epilepsy.

They list McNaughton's classification, defining (1) focal epilepsy, (2) central epilepsy, (3) unlocalized epilepsy with known cause, (4) unlocalized epilepsy due to unknown causes, and (5) temporal lobe (psychomotor) epilepsy. The investigation of epileptic patients should aim at locating the epileptogenic lesion or focal area of discharge, considered at present to be the active etiological factor, and determining its nature. The seat of discharge consists of an area of focal ischemia that sets off neuronal discharges; according to Penfield, it also produces simultaneous secondary alteration in intracerebral circulation. The neuronal discharges are conducted through neuron circuits, gradually setting up an "epileptic pattern" through repeated conduction. The epileptogenic lesions are grouped generally into expanding lesions and atrophic lesions. When a patient with seizures presents himself for examination, the first aim is to ascertain the exact location of the exciting cause. The history is of utmost importance, particularly information about the nature of the first symptom that ushers in the clinical seizure, the progression of the seizure, and what symptoms occur immediately after it. Second in importance to the initial symptom of the seizure is knowledge concerning the nature of the activating agent. Information concerning the date of the first seizure is helpful in this respect. In addition to the history, the following procedures are helpful in the study of the patient with seizures: neurological examination, electroencephalographic study, x-ray of skull, and pneumoencephalogram or pneumoventriculogram.

It has been estimated that the seizures in two-thirds of all patients with epilepsy can be controlled by medical measures. The remaining third require intensive study, and it has been suggested that about one-half of this remaining third can be materially benefited by operation. The authors review observations on 43 patients treated surgically, all of whom were examined according to the procedures outlined. Operation was recommended if the patient was refractory to medical therapy and was thought to have an epileptogenic lesion amenable to surgery. The pathological findings were cortical atrophy in 25, meningocerebral cicatrix in 6, microgyria in 5, encephalopathy in 3, venous angioma in 2, and a grossly normal cortex in 2. Five patients died, 2 of them due to the anesthetic; 8 others could not be followed up. Of the remaining 30 patients, 10 have had no seizures and no medication since operation and 3 have had no seizures with medication. Eight patients receiving medicaments have had 50% fewer seizures than before operation, 4 are slightly improved, and 5 obtained no benefit from the operation.

A Follow-up of Children Discharged from a Psychiatric Ward. W. D. Wolking, W. Quast, G. Burian and R. A. Jensen. Minnesota Med. 40:1-6 (Jan.) 1957 [St. Paul].

A follow-up was made on 200 children discharged from a hospital psychiatric service. A questionnaire sent to the parents of the patients gave them an opportunity to criticize the procedures of the service and to offer suggestions for improvement. Child psychiatry is a division of the department of pediatrics, but it works closely with the department of psychiatry. The children were hospitalized for an average period of one month. A thorough study is made during this period, following which a plan of treatment is formulated. Most of the patients are then followed on an outpatient basis. The largest group consisted of 161 patients with mild mental retardation and behavioral problems. All socioeconomic classes were represented, with a preponderance from lower middle class and lower class families; 65 children came from broken homes. One hundred fifteen (71.4%) had negative physical examinations and 26 (16.1%) had positive neurological findings. The electroencephalogram was normal or nearly normal for 99 (70.3%) and abnormal for 42 (29.7%). All socioeconomic classes were represented in the second mentally defective group, with a slight preponderance in the middle upper class. Five children came from broken homes. The presenting complaints included inability to learn, speech difficulty, behavior problems, and a few physical abnormalities.

One hundred ninety-seven questionnaires were mailed and 177 (89.9%) were answered, 173 (87.6%) of which were used. The results indicate that 17% were the same or worse, 28% slightly improved, 40% markedly improved or well, and 15% undetermined. Parents indicated their need for more detailed information about their child and more specific help in planning management. They expressed their desire for a follow-up contact, which would help them to make the best use of the hospital experience.

GYNECOLOGY & OBSTETRICS

Regional Ileitis Complicating Pregnancy. B. B. Crohn, H. Yarnis and B. I. Korelitz. Gastroenterology 31:615-628 (Dec.) 1956 [Baltimore].

The authors report on 84 pregnancies in 53 women who had regional ileitis before or during their pregnancy. The average age of the patients at the onset of ileitis was 22.2 years. The patients were followed up for 1 to 34 years. They were subdivided into 4 groups. In group 1, the largest, the ileitis was quiescent at the time of conception; in group 2 it was active at the time of conception; in group 3 the onset of ileitis occurred in the course of pregnancy; and in group 4 the onset of ileitis occurred post partum. More than half of the pregnancies in group 1 had no unfavorable effect on the ileitis, and there was no recurrence of the disease during the pregnancy or in the postpartum period. In the rest of group 1 the ileitis recurred during pregnancy or in the postpartum period. The course of the pregnancy was uneffected by the ileitis in about 85% of the pregnancies in the patients in group 2. The ileitis either subsided during the pregnancy or continued without exacerbation of the enteric symptoms during the pregnancy, but exacerbation of the disease occurred during the postpartum period in half the women after successful termination of their pregnancies. A spontaneous miscarriage oc-

curred in 2 of the 3 patients of group 3, and the diarrhea became worse after that. The pregnancy in the 3rd patient was terminated with a premature delivery of viable twins; several years later, the disease recurred to so severe a degree that a short-circuiting operation was required. The ileitis in the patients of group 4 was not severe, and only 1 patient required operation for her intestinal symptoms.

The pregnancy exerted an unfavorable effect on the ileitis particularly in those patients in whom the ileitis was active at the time of conception. The course of ileitis is likely to be severe when the disease occurs for the first time during pregnancy. It is likely to be mild when ileitis occurs as a postpartum manifestation. Patients with ileitis who have successfully survived operation show a better prognosis. In general, pregnancy is less of a hazard to patients with ileitis than to those with ulcerative colitis.

Tuberculous Endometritis: Anatomic, Clinical, and Pathological Considerations. C. Durando and G. Fanzago. Minerva ginec. 8:825-834 (Nov. 15) 1956 (In Italian) [Turin, Italy].

The authors report on a study made on a group of 17 married women aged 22 to 38 years, all believed to have tuberculous endometritis. Biopsy was performed on all patients on the 22nd to the 25th day of the menstrual cycle, with the material obtained by curettage. Aspiration biopsy was performed in those patients with more definite symptoms of tuberculous endometritis. Tests were given before therapy, after the first course of treatment, and then after every second course in order to follow the progress of the disease. Progressive endometritis with adnexal and peritoneal lesions was found in 4 patients, endometritis with localized adnexal and peritoneal lesions in 5, simple tuberculous endometritis in 5, and a form of tuberculoid endometritis in 3. Histological examination gave positive results in 12 patients and bacteriological examination gave positive results on the biopsy specimens from 11 and on the menstrual blood of 4. Cultures were positive in 13 patients (in 7 on biopsy specimens and in 6 on menstrual blood). The authors believe that this form of endometritis is severe and extended if the findings are positive in more than one of the tests given.

PEDIATRICS

Congenital Anomalies of the Arm and Hand. J. H. Kite and C. R. W. Reed. J. M. A. Georgia 46:5-8 (Jan.) 1957 [Atlanta].

This report is based on a study of 166 children with congenital anomalies of the arm and hand. Webbing of the fingers or syndactylism accounted for 77 cases, or 47%. Ectrodactylia or congenital absence of one or more fingers was observed in 29 or 17% of the children, 12 of whom had absence of the thumb only. There were 13 children with polydactylism, 10 with brachydactylism, and 6 with cleft hand. The radius was absent in 10 and the ulna in 5 children. Most of the other classifications were represented by only a few cases. Hereditary transmission was observed only in syndactylism, polydactylism, clinodactylism (deviation of fingers), and in absence of thumbs. It was most frequent in those with syndactylism, in that the parents or grandparents of 16 of the 77 patients showed a similar deformity of the hand.

Syndactylism occurs once in from 1,000 to 3,000 births. In some cases a loose web extends only part way up the fingers; in others the union extends to the end of the fingers; and in some the fingers are so tightly joined together that it is difficult to recognize the mass as two fingers. In an occasional case the entire shaft has fused and there is a common tendon, as well as blood and nerve supply, for the two fingers. In a few rare cases the thumb and all of the fingers are fused into one mass. Syndactylism is frequently associated with ectrodactylia, hypodactylia, or deformities in other parts of the body. Forty-eight of the 77 children with syndactylism had other deformities, such as syndactylism of the toes, clubfoot, hare-lip, cleft palate, deformities of the hips and the ulna, and mongolism. As regards the surgical repair of syndactylism, some advise postponement to the age of 3 to 8 years. If the fingers are the same length and do not checkrein each other, there is little harm in waiting. But if the end of the 4th finger is joined to the end of the 5th finger at the same level, the 4th finger is checkreined so that the interphalangeal joints cannot move, and the finger develops a flexion deformity. In polydactylism the extra finger is removed for cosmetic reasons and to improve function. Sometimes it is difficult to decide which finger to remove. This is true in double thumbs. At times it is well to wait until the patient is older before removing the extra finger. Occasionally, the doctor delivering the baby will remove the extra finger or toe shortly after birth. This is usually an ill-advised procedure. Prostheses are useful in patients with congenital absence of part of the arm.

Addison's Disease During Childhood. W. H. H. Tegelaers, P. J. M. F. Verdonck and P. J. Ruys. Maandschr. kindergeneesk. 24:385-401 (Dec.) 1956 (In Dutch) [Leyden, Netherlands].

The authors point out that besides the adrenogenital syndrome various other causes may produce adrenal insufficiency in children, such as aplasia, hypoplasia, hypofunction of the adrenal cortex, and gradual destruction of the cortex. The first case presented here is that of a newborn boy in whom the symptoms suggested retroperitoneal bleeding probably of adrenal origin. The child improved after blood transfusion and the infusion of sodium chloride solution. Intravenous pyelography 2 months later revealed evidence of a calcified hematoma in the region of the right adrenal, and the left adrenal also showed evidence of calcification. At the age of 2, this child showed no signs of adrenal insufficiency. The authors have observed no signs of adrenal cortical hypofunction in nurslings or young children who recovered from the Waterhouse-Friderichsen syndrome or in patients in whom this syndrome developed after meningococcemia. Thus there remain as causes of

adrenal insufficiency in childhood aplasia, congenital hypoplasia, and slowly destructive processes such as tuberculosis, tumors, primary atrophy, and the adrenogenital syndrome.

The second case presented is that of a 7-year-old boy, in whom signs of adrenal cortical hypofunction developed after tonsillectomy. Uncomplicated adrenal cortical hypotrophy from primary atrophy of the adrenals is rare in children of this age. The authors emphasize the slight resistance of this patient to stress and the efficacy of treatment with small doses of cortisone and the addition of salt to the diet. Repeated studies on the protein-bound iodine suggested that other incretory glands were involved. In the differential diagnosis attention was given to Addison-like symptoms in the adrenogenital syndrome with adrenal hyperplasia. These findings are rarely seen in the absence of cortisone treatment in children more than 1 year old. In connection with this case of the 7-year-old boy the authors mention that of a newborn male infant with full-blown adrenal cortical hypofunction and with the adrenogenital syndrome. A newborn girl with a mild form of the same syndrome and with pseudohermaphroditism showed increased urinary excretion of aldosterone.

UROLOGY

Results of Prolonged Treatment of Renal Tuberculosis with Antibiotics. S. Petkovic and V. Ilic. Urologia **23**:458-465 (Oct. 20) 1956 (In French) [Treviso, Italy].

The authors report on 149 patients with renal tuberculosis followed from 1945 to 1955; 53 were treated in the preantibiotic era, and only 5 of them received antibiotics later. Antibiotics were given continuously during the first 2 years of treatment and were withheld for short periods only after the lesions were stabilized and culture tests had been giving negative results for some time. These periods of rest reduced the total dose of streptomycin given to each patient. Those with severe forms of the disease received uninterrupted treatment for at least 3 years. The antibiotics given were aminosalicylic acid, 12 to 14 Gm. per day; isoniazid, 250 to 350 mg. per day, and streptomycin, 1 Gm. every 2 to 3 days, later 1 Gm. of streptomycin was given every 3 days. The treatment was well tolerated. None of the patients treated without antibiotics was alive 7 years after the beginning of treatment. Only 1 patient of the remaining 101 treated with antibiotics died during the period 1944-1955; 2 who died during the first few months of 1956 showed signs of renal failure. The case fatality rate among patients treated with antibiotics was 3%.

Etiological Considerations on the Changes of Renal Function in Patients with Hypertrophy of the Prostate. A. Medici and G. Uleri. Minerva med. **47**:1673-1677 (Nov. 21) 1956 (In Italian) [Turin, Italy].

Changes of the renal function were studied in 14 patients with hypertrophy of the prostate. All patients were catheterized on admission. The patients were then put to bed and given no food from midnight until the next morning, when serum urea level and the volume of urinary excretion per minute, glomerular filtrate, absolute tubular resorption, and tubular urine resorption were measured. A specimen of urine was obtained by catheterization. Then the patients were given 150 cc. of water by mouth, and, after an hour of absolute bed rest, blood for a serum urea determination was drawn. Later, another specimen for a serum creatine determination was obtained. The residual urine was drawn off by catheter after 30 minutes and tested quantitatively for urea and creatine. All patients were subjected to cystotomy or transvesical prostatectomy, depending on their renal function tests, their general condition, and their age. The same tests were given again 10 to 12 days after the operation. The serum urea level before operation was 190 to 300 mg. per 100 cc. After the operation it dropped in all patients except 1, in whom it increased slightly. The volume of urinary excretion per minute was below normal in all patients before operation but increased after the operation in all but 2 patients with acute retention. The volume of the glomerular filtrate became physiological postoperatively in patients without acute retention. The increased volume of glomerular filtrate that was present in patients with acute retention decreased but did not become normal after the operation. The tubular urine resorption became normal in all patients after operation. The authors believe that there is no direct relationship between the residual urine and the renal function and that the tubular damage is more severe in patients with chronic urinary retention than in those with acute retention.

INDUSTRIAL MEDICINE

Pulmonary Complications with Silicone Masonry Water Repellents. H. J. Horn, D. J. Kilian and R. A. Smith. A. M. A. Arch. Indust. Health **15**:63-67 (Jan.) 1957 [Chicago].

A 19-year-old youth was admitted to the emergency room of a Denver hospital. He was cyanotic and restless, coughed severely, and complained of difficulty in breathing and of tracheal irritation. He had spent 4 hours that morning without a protective mask spraying cinder blocks with a water-proofing silicone-petroleum-solvent material, using an automatic high-pressure spray gun. No ill-effects were felt during spraying, but after eating his lunch he developed an irritating cough, which was followed shortly thereafter by nausea and retching. One and one-half hours after stopping the spraying he had intractable cough and was brought to the hospital. He was given fluids intravenously, oxygen nasally and barbiturates and morphine. Steam was also used, but no improvement could be obtained, and the patient appeared seriously ill. He spent a restless, uncomfortable night with continuous cough. By morning he had a severe subcutaneous emphysema of the face, neck, chest, deltoid areas, and upper arms. A repeat chest x-ray at this time showed extensive mediastinal emphysema, with diffuse clouding of both lung fields and beginning pneumothorax of the right and left pleural cavities. By the

evening of the second day there was an increase in the extent of subcutaneous emphysema, and a chest x-ray revealed increased pneumothorax. The following morning a tension pneumothorax on the right side had become obvious, and an indwelling pleural tube was inserted into the 3rd interspace anteriorly, with continuous suction. The patient's clinical condition began to improve after insertion of the tube. Interpleural suction was discontinued on the 8th day of hospitalization, and the patient was discharged. Subsequent chest x-rays appeared normal.

Experimental studies on dogs, rats, and guinea pigs exposed to the silicones, to several petroleum solvents, and to masonry water repellents made with silicones in various petroleum solvents did not duplicate the exact clinical conditions seen in the patient. Numerous inhalation experiments demonstrated that there is no significant difference in pulmonary pathology between the final formulations of the silicone masonry water repellents and the various petroleum solvents. It seems reasonable, therefore, to conclude that the most irritating agent in the masonry water repellents is the petroleum solvent. This conclusion is enhanced by the lack of serious pulmonary changes in the dogs exposed to massive respiratory doses of silicone alone.

Retirement: A Socio-Medical Study of 244 Men. I. M. Richardson. Scottish M. J. 1:381-391 (Dec.) 1956 [Glasgow].

This paper reports some of the findings obtained by personal interview with 244 retired men. The main aims of the survey were to define in more detail why people retire, especially on medical grounds, to examine the reemployment potential of those already retired, and to investigate the use made of retirement. Just over one half of the group had a disability of occupational significance. The commonest disabilities were heart disease, arthritis, and bronchitis. Retirement had most frequently been due to ill-health or action by the employer, but the cause of retirement varied with age and social class. Roughly half of the wholly retired men had not found a contented way of life. In contrast, almost all those doing part-time work were satisfied with their compromise between full-time employment and complete retirement. The main activities of the retired men were helping at home, walking, and gardening. The prevalence of true hobbies was low.

Inhalation of Arsenic and Bronchial Carcinoma in Vineyard Workers. H. Hess. Arch. klin. Chir. 283:274-279 (No. 3) 1956 (In German) [Berlin].

In the course of 6 years the authors observed bronchial carcinomas in 8 vineyard workers who before 1940 had been using pesticides containing arsenic for dusting and spraying. Their bronchial carcinomas proved particularly malignant. The occupational origin of the bronchial carcinomas was investigated, and in 2 of the 8 patients the authors gave medicolegal testimony on the causal connection between the inhalation of the arsenic-containing sprays and the bronchial carcinoma. The claim of the occupational origin was based on the following factors: 1. The men had been vineyard workers for several years and had used pesticides that contained arsenic for dusting and spraying for several years. 2. This involved the inhalation of the carcinogenic substance in a sufficiently high dosage. 3. Chronic bronchitis and precancerous lesions (bridging symptoms) developed during the period or shortly after the toxic dusts and sprays were used. 4. The patients had external signs of chronic arsenic poisoning. 5. The latent period was sufficiently long.

PATHOLOGY

Small-Cell Malignant Lesions of the Thyroid Gland. A. J. Walt, L. B. Woolner and B. M. Black. J. Clin. Endocrinol. 17:45-60 (Jan.) 1957 [Springfield, Ill.].

The authors studied the microscopic slides of all primary malignant neoplasms of the thyroid gland seen at the Mayo Clinic between 1929 and 1954. Thirty small-cell malignant lesions were found among them. These were divided histologically into 2 distinctive groups, consisting of 18 malignant lymphomas and 12 small-cell carcinomas. Thirteen of the 18 patients with malignant lymphomas were women and 5 were men, and the average age of these patients was 56 years. Ten of the 12 patients with small-cell carcinomas were women and 2 were men, and the average age in this group was 53.5 years. These lesions are uncommon in patients aged less than 40 years. There is a predominance of women as in all groups of patients with thyroid neoplasm.

The need to adopt strict criteria in the diagnosis of chronic lymphomatous thyroiditis (Hashimoto's disease) before speculating on any possible association with small-cell malignant lesions is stressed. The basic changes in the thyroid of patients with chronic lymphomatous thyroiditis consist of diffuse epithelial degeneration in which the acinar cells frequently show marked eosinophilic features; varying degrees of lymphocytic and plasma-cell infiltration; and variable amounts of fibrosis. All these features are present to some degree in any one patient with chronic lymphomatous thyroiditis. Unequivocal chronic lymphomatous thyroiditis was detected in 2 of the 14 cases of malignant lymphoma in which sufficient tissue for adequate samplings was present, but this series is too small to lend itself to any firm conclusions as to possible relationships.

The prognosis in the group of malignant lymphomas was much better than in tumors designated as small-cell carcinomas. Six of the 18 patients with malignant lymphomas were alive and asymptomatic 4 years or more after they were first treated. No patient with small-cell carcinoma survived longer than 19 months. Surgery has a definite place in the treatment of malignant small-cell lesions of the thyroid. It is essential for the confirmation of the diagnosis, and thereafter it may be directed toward palliation or cure. Apparent cure of patients with lymphoma of the thyroid may occur after unilateral or bilateral thyroidectomy fol-

lowed by radiotherapy. It would appear that surgical excision should always be followed by irradiation, until more knowledge is available. Surgical treatment of malignant lymphoma of the thyroid should be vigorous and should not be abandoned even in the face of local attachment to muscle or peritracheal and periesophageal tissue.

Pulmonary Fibrosis and Giant-Cell Reaction with Altered Elastic Tissue: Endogenous "Pneumoconiosis." R. L. Walford and L. Kaplan. A. M. A. Arch. Path. 63:75-90 (Jan.) 1957 [Chicago].

Routine slides of the lungs from autopsies performed at the Veterans Administration center during the past 8 years are reviewed. The series comprises approximately 7,000 autopsies. Eleven cases were noted to possess the features described in this report. The records of a 12th case were supplied by Dr. Saphir of Michael Reese Hospital, Chicago. Clinically these cases were characterized by a fairly progressive course, lasting from 1 to 21 years (average, 6.7 years), with symptoms of dyspnea, cyanosis, frothy hemoptysis, and cor pulmonale. Left-sided heart disease, including mitral stenosis, aortic stenosis, hypertensive heart disease, arteriosclerotic heart disease, and syphilitic valvulitis, was present in 8 and absent in 4 of the 12 patients. Histologically, the pulmonary elastic tissue showed marked fragmentation, reduplication, thickening, and intense basophilia. These elastica changes provoked an intense sclerosing foreign-body-giant-cell reaction and pulmonary fibrosis sufficient to cause death directly from pulmonary failure. The authors discuss the pertinent literature having to do with pulmonary elastica disease of various types. These include Ceelen's idiopathic pulmonary hemosiderosis, the pulmonary changes in mitral stenosis, rheumatic pneumonitis, and pseudoxanthoma elasticum, as well as others. Injured pulmonary elastic tissue may act as a foreign body or sequestrum and produce a progressive "pneumoconiosis."

Intrehepatic Cholestasis ("Cholangiolitis"). H. Popper and P. B. Szanto. Gastroenterology 31:683-700 (Dec.) 1956 [Baltimore].

Liver biopsy and autopsy specimens obtained from patients with clinical and laboratory evidence of acute and chronic intrahepatic cholestasis in the absence of extrahepatic biliary obstruction were studied. They were compared with those obtained from patients with similar liver disease but without intrahepatic cholestasis and with specimens obtained from patients in the same stages of proved extrahepatic obstruction. Intrahepatic cholestasis is a response of the hepatic parenchyma to injury of any kind. It may be a component in various hepatic diseases with hepatocellular damage such as viral hepatitis as well as postnecrotic and septal (e.g., nutritional) cirrhosis. It may also be the sole manifestation of liver disease with jaundice, not necessarily associated with liver cell damage, and may be seen in patients after exposure to various drugs or without established causation.

Intrahepatic cholestasis is not regularly associated with any specific morphological manifestations except for increased deposition of bile, which is probably the result rather than the cause of the intrahepatic cholestasis. Specifically inflammatory changes may not be observed in the acute stages of pure cholestasis. Applying opinions and observations of other workers, it is assumed on the basis of the morphological picture in the various types and stages of intrahepatic cholestasis that it starts with an increased permeability of the ductules leading to bile regurgitation as well as transient inflammatory exudation in drug sensitivity. Inspissation of the bile in the ductules adds an obstructive component to the leakage. The latter occasionally incites periductular inflammation, which is a result rather than a cause of the intrahepatic cholestasis. The inflammation finally stimulates periductular fibrosis as an additional mechanical obstructive factor in the late stages. Intrahepatic cholestasis can be differentiated unequivocally from extrahepatic biliary obstruction only in the rare cases when the latter produces hydromechanically dilatation of the bile duct, bile infarcts, and extravasation of bile into the portal tracts.

Hyalinosis of Skin and Mucous Membranes (Urbach-Wiethe's Lipoid-Proteinosis): Histochemical Study of a Case 28 Years After Its First Publication. H. Ungar and I. Katzenellenbogen. A. M. A. Arch. Path. 63:65-74 (Jan.) 1957 [Chicago].

A syndrome consisting of disseminated areas of hyalinosis and lipid deposits in the dermis, the oral mucosa, and the larynx was first described in 1929 by Urbach and Wiethe. This paper reports observations made with the aid of recent histochemical methods on a series of biopsy specimens in one of the patients, in whom the disorder was first recognized by Urbach. The structural changes in this patient corresponded in general with those described in the literature as "lipoid-proteinosis." In addition, a progressive and severe hyalinosis of the sweat glands was found. Degeneration and destruction of elastic fibers and the appearance of argyrophile fibrils throughout the dermis, hyalinosis of the upper layers of the dermis, beginning around small arterioles of the sweat glands, and nodular hyalinosis of the oral mucosa were the essential lesions found in this patient. Histochemical study of the hyalin revealed the likelihood of its containing carbohydrates but little or no protein. Acidic rests were probably present in the early period of hyalin formation. In contrast to the earlier observations on this patient no lipids could now be identified within the moderate quantity of sudanophil material demonstrable by histological methods. In discussing various theories of the histogenesis of the lesions, the authors point out that, although interference with the fluid exchange may feasibly affect the structure of fibrillary connective tissue, recent histochemical studies and in vitro experiments with human tissues seem to corroborate the view that the hyalin originated in a chemical change of the collagen and elastic fibers.

Blood Grouping Tests in Disputed Parentage: Qualifications of Experts. A. S. Wiener. J. Forensic Med. 3:139-148 (Oct.-Dec.) 1956. [Cape Town,South Africa].

The importance has been stressed of permitting only fully qualified experts to carry out blood tests in medicolegal cases, in order to avoid the possibility of errors and miscarriages of justice. At the same time, with the increased demand for this type of examination, there has been a tendency for persons who are not fully qualified to undertake the tests. As a result, serious errors have been made. Wiener has rechecked a number of cases and has uncovered errors. He presents 3 such cases and comments on the precautions that should be taken to prevent similar errors in the future. One physician testified that an accused man belonged to group O International, group I Jansky, and group IV Moss, while the child belonged to group A International, group II Jansky, and group II Moss, and that therefore paternity was excluded. Cross examination disclosed the fact that this "expert" had performed only 3 or 4 blood-grouping tests in his entire experience of 20 years. Apparently, the witness thought that by using all 3 nomenclatures his testimony would appear more learned and impress the court. When asked why he had not tested the blood of the mother, he responded that the question of maternity was not an issue.

In a second case, a pathologist reported the putative father to be group B, the mother to be group O, and the child to be group A, so that paternity was excluded. Retests by the author showed the putative father to belong to subgroup A_2B and the child to subgroup A_2. As a result of this kind of experience, courts in New York City now permit the use only of experts whose names are included in a list provided by the New York Academy of Medicine. A fully qualified expert in blood grouping is not merely an accurate technician but a person thoroughly versed in the fundamentals of blood group serology and genetics. The facts that have been unearthed about the Rh-Hr types are exceedingly complex, but to a person who thoroughly understands the subject, the Rh-Hr terminology offers no problem, and such a worker has no difficulty in preparing a clear report when presenting his evidence before a lay bench and jury.

Post-Mortem Persistence of Sex Chromatin. A. D. Dixon and J. B. D. Torr. J. Forensic Med. 1:161-168 (Oct.-Dec.) 1956 [Cape Town, South Africa].

The intranuclear mass of chromatin was originally called the nucleolar satellite, but, as its position is variable, the term that implied its topography was discarded and it was renamed the sex chromatin. The application of these findings, in the form of the skin biopsy method of sex determination, has proved of clinical value in the diagnosis of various types of abnormal sex development. More recently the simpler method of examining smears of oral epithelial cells has proved to be equally efficacious and is likely to eliminate the necessity for skin biopsy. In addition to their clinical value, it is probable that these methods might be employed in the medicolegal cases to aid, for example, in the identification of a body mutilated beyond recognition; for if postmortem changes are not too advanced, it may be possible to determine the sex of the individual from a small fragment of tissue. However, the length of time after death during which the sex chromatin may be expected to remain as a readily demonstrable entity has not yet been established, and the present investigation has been undertaken for this reason.

The persistence of this nuclear feature was studied in dissecting room material and in the skin of full-term fetuses, exemplifying respectively fixed and unfixed tissues. It was found that the sex of small fragments of fixed epithelia and cartilage can be determined by an examination of nuclear morphology. The length of time for which the tissues have been preserved is not significant, sex differences having been observed in tissue that had been in the preserved state for periods up to 7 years. By employing a similar technique it is possible to determine the sex of unfixed tissues, but in this case the period during which accurate diagnosis may be made is very much shorter. It varies from 2 to 3 weeks after death in fetal tissues, depending on the nature of the environment in which the tissue has been placed. In the determination of the sex of an individual in medicolegal cases, cartilage cells should, if possible, be obtained for examination, as they appear to retain the normal morphological features of sex chromatin to best advantage.

RADIOLOGY

Pleuropulmonary Tularemia: Its Roentgen Manifestations. J. M. Dennis and R. P. Boudreau. Radiology 68:25-30 (Jan.) 1957 [Syracuse, N. Y.].

Twenty-eight patients with tularemia were successfully treated at the University of Maryland Hospital between 1947 and 1955. The sources of infection were the same as those reported previously, i.e., contact with infected rabbits and ticks and the ingestion of infected rabbit meat. Two cases occurred in laboratory assistants. The diagnosis in all instances was based upon the presence of serum agglutinins against Pasteurella tularensis or isolation of the organism. Pleuropulmonary involvement was demonstrable roentgenologically in 14 of the 28 cases. It occurred in 7 of 10 patients with the typhoidal form of the disease and in 5 of 15 patients with the ulceroglandular form. Two cases were primary in the lung. Roentgenologically, the pulmonary involvement varied from a stringy peribronchial infiltration to one of homogeneous density with a lobular distribution. In a few cases both types were present, but the lobular homogeneous pattern was far more prevalent. The infiltration varied greatly in location and extent. In 5 patients the process was bilateral, and in 3 it was diffusely scattered throughout both lungs. In 1 of this latter number, the infiltrative lesion was of the stringy peribronchial type, diffusely involving both lungs. In 3 other patients, the homogeneous infiltrate appeared as a spherical density, recently described by Ivie as typical of tularemic pneumonia. In only 1 instance was there suggestive evidence of cavitation,

and this developed as the infiltrative lesion underwent resolution. Hilar and mediastinal adenopathy was present in 3 cases. Irrespective of the location or extent of the pulmonary involvement, there was almost always a tendency for its resolution to lag well behind the prompt clinical response to specific therapy.

Pleural involvement occurred in 9 of the 14 cases varying from a slight thickening of an interlobar septum to extensive effusion. While in most instances the pleural effusion was mild, it was always bilateral when parenchymal involvement was bilateral. Although the roentgenologic findings in tularemic pneumonia are not specific, some of them may suggest the correct diagnosis before the development of serum agglutinins against P. tularensis, which usually appear one to two weeks after inoculation. Prompt antibiotic therapy not only has decreased the morbidity and mortality rates in tularemic pneumonia but also has altered its roentgen aspects. Early investigators noted the resemblance of the more chronic forms to tuberculosis, with a tendency to necrosis and cavitation. In the present series not a single instance of resemblance to tuberculosis was encountered, and in only 1 case was there evidence of cavitation, which developed as the infiltrative lesion underwent resolution. Early diagnosis and specific therapy may also serve to abort almost completely the roentgenologic findings.

Radiation Therapy of Neuroblastoma. W. B. Seaman and M. B. Eagleton. Radiology **68**:1-8 (Jan.) 1957 [Syracuse, N. Y.].

The prognosis of children with neuroblastoma has shown remarkable improvement in recent years. Despite the bizarre natural history of this neoplasm, which includes spontaneous regression and maturation into a more differentiated benign form, the authors feel that the improved outlook is due chiefly to the intelligent use of x-ray therapy. Although surgical excision may be curative when no distant metastases are present, frequently the tumor is not resectable, and radiation therapy is the chief therapeutic agent. Nineteen patients with neuroblastoma were treated at the Mallinckrodt Institute of Radiology during the 6-year period terminating July, 1955. The diagnosis was confirmed microscopically in all children. Seven of the 19 children have survived the irradiation for from 10 to 76 months and 5 of them for more than 3 years (45 to 76 months). The 7 patients ranged in age from 2 to 17 months. Surgery was used for diagnostic purposes except in 1 patient, in whom a visible tumor was excised. The 5 patients who have survived radiation therapy for more than 3 years include 1 with histologically verified osseous metastases and another with microscopic evidence of liver metastases. Although cures have been recorded in cases with metastases to the liver, reports of recovery in the presence of skeletal metastases have been rare.

The authors cite the history of the boy who was hospitalized at the age of 13 months. The x-ray diagnosis was mediastinal neuroblastoma with metastases to the long bones, skull, and orbit. Roentgen therapy was applied to a 10-by-10-cm. portal over the left frontal region, including the orbit, and a 5-by-10-cm. area over the anterior mediastinum. One field was treated daily, for a dose of 150 r in air, with 200-kv equipment at a 50-cm. target-skin distance and a half value layer of 1.0 mm. Cu. After a total of 2,000 r in air was delivered to each of these two fields, 800 r in air was given to both tibias, the left humerus and forearm, and the right humerus through 12-by-7 and 10-by-5-cm. areas, with daily increments of 400 r. The left femur received 1,050 r in air. The total treatment time was 47 days. The child tolerated therapy well and improved steadily. Several transfusions were necessary to control the anemia. After 1 month he was eating normally and had begun to walk again. Two months after the completion of therapy he was well except for epilation over the left anterior scalp. Roentgenograms showed evidence of healing and regression of the osseous metastases. It is now over 5 years since the beginning of therapy, and the patient has remained in excellent health. The roentgen abnormalities have completely disappeared. All of the patients who died did so quite soon after therapy, usually without even an initial transient remission. Although it has been stated that a 1-year survival is equivalent to a 5-year survival in the average adult cancer, a number of cases of neuroblastoma have been reported in which death occurred from 3 to 6 years after treatment. A high survival rate seems to occur in the younger age group. Because of occasional survivals of patients with metastases, extensive disease should not be a contraindication for radiation therapy. The neuroblastoma is one of the few milignant tumors in which aggressive therapy is justified regardless of the extent of its dissemination.

Nocardiosis: A Case Report and Brief Review of the Literature. G. A. Gundersen and C. M. Nice Jr. Radiology **68**:31-35 (Jan.) 1957 [Syracuse, N. Y.].

The authors report on the clinical course and radiographic story of a boy who showed symptoms shortly after birth and was kept under observation until he died in his 6th year. He probably had nocardiosis all his life. He was asymptomatic during the last part of his 4th and first part of his 5th year. After the 5th birthday, cutaneous pustules and bronchopneumonia recurred, aerobic gram-positive rods being cultured from the pustules. Calcium deposits in the liver became more apparent. When the patient was last admitted, late in his 6th year, culture of a fluctuant mass over the thyroid revealed Nocardia asteroides, the fungus being positively identified only after death. At autopsy the organism was identified in sections of the lungs, liver, kidneys, and spleen. The leptomeninges were fibrinous over the base of the brain, but the fungus could not be identified. The disease deserves early recognition, because appropriate antimicrobial therapy, specifically with the sulfonamides, appears to halt and perhaps heal nocardiosis. It should be considered when a relatively healthy-appearing child has extensive lung infection demonstrable radiographically, with pustules appearing on the skin shortly thereafter. The finding of gram-positive cocci and bacilli in sputum, blood, and pus should be another clue. Lack of response to the newer antimicrobials may also be suggestive of a fungous infection.

BOOK REVIEWS

Lesions of the Cervical Intervertebral Disc. By R. Glen Spurling, M.D., Professor of Neurosurgery, University of Louisville School of Medicine, Louisville, Ky. Publication number 301, American Lecture Series, monograph in Bannerstone Division of American Lectures in Surgery. Edited by Michael E. De Bakey, M.D., Professor of Surgery and Chairman of Department of Surgery, Baylor University College of Medicine, Houston, Texas, and R. Glen Spurling, M.D., Neurosurgery Division. Editor: Barnes Woodhall, M.D., Professor of Neurosurgery, Duke Hospital, Durham, N. C. Cloth. $4.75. Pp. 134, with 41 illustrations. Charles C Thomas, 301-327 E. Lawrence Ave., Springfield, Ill.; Blackwell Scientific Publications, Ltd., 24-25 Broad St., Oxford, England; Ryerson Press, 299 Queen St., W., Toronto, 2B, Canada, 1956.

In this excellent monograph, the author begins his presentation by giving a well-documented historical review of lesions of the cervical spine. The discussion of the diagnosis of intervertebral disk lesions, the illustrations, and the case reports are clear and concise. After reading this monograph one should have a firmer grasp of the subject and should be better able to appreciate clinical findings. The author outlines the conservative treatment of these lesions, as well as the surgical treatment, which should not be entered into lightly. The book is well illustrated and holds the reader's interest.

Operative Surgery. Volume One: Introductory; Surgery of Trauma; Abdomen [Part]. Volume Two: Abdomen (Completion). Under general editorship of Charles Rob, M.C., M. Chir., F.R.C.S., Professor of Surgery, St. Mary's Hospital, London, and Rodney Smith, M.S., F.R.C.S., Surgeon, St. George's Hospital, London. [To be in 8 volumes.] Cloth. $19.50 per volume. Pp. 141; 137-543, with illustrations. Butterworth & Co., Ltd., 88 Kingsway, London, W. C. 2, England: [F. A. Davis Company, 1914-16 Cherry St., Philadelphia 3], 1956.

These volumes are the first of an eight-volume publication. Consulting editors were chosen from the fields of general surgery, orthopedic surgery, plastic surgery, ophthalmology, otolaryngology, obstetrics and gynecology, and neurosurgery. Forty-five authors contributed to these publications. Volume 1 consists of three parts. Part 1 deals with the general principles of surgery. Some of the subjects covered in this segment include local anesthesia, ligature materials, hemostasis, drainage, skin preparations, and the use of retractors; part 2 deals with all phases of traumatic surgery, including fractures; and part 3 deals with abdominal surgery and is continued in volume 2. Volume 2 has divisions on hernia; the appendix, mesentery, and peritoneum; the spleen and operations for portal hypertension; the pancreas; the biliary system and liver; the small intestine; and the colon. The authors approach a surgical problem by outlining the preoperative care, the operative procedure (with numerous informative line drawings), and the postoperative care, including complications. A limited and selective bibliography, primarily British, follows each section. The bibliography in many sections is not current. The editors state in the introduction that some contributors have included techniques that the editors themselves do not use and that discussions of such procedures were included because each contributor was considered an expert in his particular field.

These publications are intended for the general surgeon. They should also be useful to the general practitioner, student, resident, and intern, but it is doubtful that the specialist, in any field of surgery, would find them of much help. When one compares these British publications with current publications on operative surgery in the United States, one notes that many outdated procedures and concepts that have been dropped from American publications are included in the British volumes. No mention is made of the possibility of tumor cell implantation after operations on the colon. American surgeons are very cautious in this regard. The section dealing with the biliary tract is very well done. The style of writing and choice of words are superior. The illustrations are clear and accurately describe the operation.

Ageing in Industry: An Inquiry, Based on Figures Derived from Census Reports, into the Problem of Ageing under the Conditions of Modern Industry. By F. Le Gros Clark and Agnes C. Dunne. Cloth. $7.50. Pp. 153. Philosophical Library, Inc., 16 E. 40th St., New York 16, 1956.

The authors have attempted to determine what numbers of male British workers are physically able to continue in their various occupations beyond their mid-60's. They select 32 representative occupations fulfilling certain criteria and apply to them data derived from the census reports for 1921, 1931, and 1951. By the method of "moving cohorts," the authors endeavor to trace the fate of a category of workers through the three census periods. By comparing the census figures for each period as they apply to the selected categories or "cohorts," they believe they can show how many of these (1) have remained in the same occupation, (2) have retired and are unemployed, (3) have migrated overseas, (4) have died, and (5) have transferred to some other occupation. On the basis of these data, the survival rates of each of the occupations are given. It is interesting to find that more makers of watches, clocks, musical instruments, and workers in precious metals remain at work into their late 60's and beyond than do workers in any other occupation. The fewest survivors are found among coal face workers and signalmen. The occupations are also classified in terms of those into which men move in later life and those from which there is a drift at the same period of life.

As the authors admit, the statistical data are not wholly reliable, in some respects not comparable, and with regard to 1951 incomplete and insufficient for the purpose. Furthermore, the time interval chosen for the analysis was a period of vast social and economic change, during which there were reconstruction periods following two world wars and a great economic depression. Because of all this, extensive improvisations and interpretations of the census data were necessary. Unfortunately, this inevitably raises a se-

These book reviews have been prepared by competent authorities but do not represent the opinions of any medical or other organization unless specifically so stated.

rious question in the mind of the reader as to the validity of the conclusions drawn by the authors. One wonders whether there is not a more reliable method of answering the question propounded, such as a direct study of the employment and separation records in representative industries covering the occupations chosen. It is true that this might also involve a statistically significant number of follow-up studies, but the authors have set themselves the task of answering an important but difficult question. They may have provided the answer to the question of what numbers of workers continue in their various occupations beyond their mid-60's, but they failed to show that continuation or failure to continue working was related to physical ability.

Lymphatics, Lymph and Lymphoid Tissue. By Joseph Mendel Yoffey, D.Sc., M.D., F.R.C.S., Professor of Anatomy, University of Bristol, and Frederick Colin Courtice, M.A., D.Phil., D.Sc., Director, Kanematsu Memorial Institute of Pathology, Sydney Hospital, Sydney. Cloth. $10. Pp. 310, with 99 illustrations. [Published for Commonwealth Fund by] Harvard University Press, Cambridge 38, Mass., 1956.

This book represents a thoroughgoing revision of "Lymphatics, Lymph and Lymphoid Tissue," by Drinker and Yoffey. It constitutes a comprehensive review of the subject. The thesis, that the chief mission of the lymphatics is to return to the blood stream the large protein molecules that slowly, but continually, leak through the pores of the capillaries, is presented in a convincing and lucid manner. The authors' discussion of the biological significance of lymphoid tissue is thought-provoking and comprehensive. The writing is scholarly and clear. The numerous illustrations are helpful in explaining the more complex subjects. A special section on practical considerations covers such important topics as circulatory edema, hunger edema, ascites, reaction to injury, traumatic shock, lymphatic obstruction, and the role of the lymphatics in the spread of infection and in the spread of tumors. Extensive bibliographic references follow each chapter. The author index and subject index are of superior quality. The book should be of particular interest to physiologists, internists, surgeons, and other physicians especially interested in the lymphatics and to students.

New Advances in Medicine—and What They Mean to You. By Morris Fishbein, M.D. Cloth. $3.50. Pp. 224. Hanover House, Garden City, N. Y., 1956.

This book contains more information on advances in medicine than any other volume available to the layman. It is well written in a style that should be understandable to anyone with a high school education. It deserves a place in every household. Not only is it of value to the layman, but also it should provide a valuable review even for the well-informed physician and surgeon. The chapter on heart disease shows how our conception of the various cardiac conditions has changed in the last 50 years, especially with regard to coronary artery disease. The chapter on cardiac operations is also of special importance. The use of the new drugs, especially acetazolamide, is well described. A concise chapter on general surgery describes the advances that have been made in operations on the stomach, duodenum, lungs, and blood vessels. The chapter on infectious diseases illustrates the changes that have come with the new antibiotics. The chapter on skin gives the reader a better understanding of the irritants to which the skin is exposed. The chapter on allergy contains special reference to allergies in children and the rational use of antihistamines, cortisone, and corticotropin. That on cancer points out the importance of research, and that on new drugs describes such preparations as cycloserine, viomycin, neomycin, and the tranquilizing drugs. The chapter on infants and children should be of great value to mothers, and that on old people should be read by all physicians. The chapter on radioactivity describes the use of isotopes. That on the future points to the decline in the death rate in the United States since 1900.

Textbook of Human Anatomy. By J. D. Boyd, M.A., M.Sc., M.D., Professor of Anatomy in University of Cambridge, England, et al. Edited by W. J. Hamilton. Cloth. $16.50. Pp. 1022, with 797 illustrations. St. Martin's Press, Inc., 103 Park Ave., New York 17; Macmillan & Co., Ltd., 10 St. Martin's St., London, W.C.2, England, 1957.

This new textbook has been written to reflect the change of relative values in the mass of detail that has been offered to students of anatomy in the past. It is also intended to afford a closer correlation between structure and function, and to introduce the student to the wider biological implications of his anatomic studies. The work of six contributors has been edited smoothly to produce a text of uniformly readable quality. An introductory section presents some fundamental material on the histology of blood and connective tissue. It is followed by sections on the locomotor system, cardiovascular system, respiratory system, digestive system, urogenital system, ductless glands, spleen, central nervous system, and peripheral nervous system. There is a wealth of illustrations. The anatomic views are directly and explicitly labeled, a relief to students who have ever had to decipher the maze of abbreviations and fine-printed legends of older textbooks. The closing section on growth presents much interesting and valuable material. The index is good. The book as a whole is attractive, partly because of the excellent choice of paper, type, and binding, and partly because of the freshness and clarity of the illustrations.

Principles of Chest X-Ray Diagnosis. By George Simon, M.D., F.F.R., Assistant Director, X-ray Department, Brompton Hospital, London. Cloth. 50s.; $8.50. Pp. 183, with 162 illustrations. Butterworth & Co., Ltd., 88 Kingsway, London, W. C. 2, England; [F. A. Davis Company, 1914-16 Cherry St., Philadelphia 3], 1956.

In this book written for students, radiologists, and clinicians, the author adopts a somewhat different approach in which the material is arranged under headings descriptive of the x-ray shadows rather than under the clinical disease labels. A particular type of abnormal shadow having been identified, various diseases producing such an appearance can be considered in a differential manner, leading to a definitive interpretation in correlation with the clinical picture. Such an approach is logical and is that used by radiologists in their everyday work and in teaching.

A section on definition of terms in the introduction not only is interesting but greatly enhances the value of the book. The subject matter includes not only the various types of shadows within the lung but also those within the cardiovascular system, the mediastinum, the diaphragm, the thoracic cage, and the soft tissues. Bronchography and tomography are also discussed. The appendix deals with x-ray technique. The author's approach may be exemplified by the consideration in chapter 2 of homogenous shadows, grouped according to shape, size, or distribution. In this manner each chapter deals with a particular type of shadow. The discussions of the individual abnormalities are concise, easy to read, and well illustrated. The illustrations are for the most part, reproductions of roentgenograms. This book should be a welcome addition to the library of any radiologist or clinician concerned with chest disease. It is also recommended to residents in radiology as representing a most logical approach to the consideration and interpretation of diseases of the chest.

A. M. A. Scientific Exhibits 1956. Sponsored by Council on Scientific Assembly, American Medical Association. Cloth, $10. Pp. 411, with illustrations. Grune & Stratton, Inc., 381 Fourth Ave., New York 16, 1956.

It has been said that the Scientific Exhibits presented at each Annual Meeting of the American Medical Association offer the finest medical postgraduate courses in the world. With this in mind, the publishers have arranged to show physicians who were unable to attend last year's convention the latest advances of medicine in a form that can be comprehended quickly—the visual impression. Over 50 of the exhibits have been photographed and reproduced in their entirety, including Office Procedures for Cancer Diagnosis, Dermatological Lesions Seen in General Practice, The Action of Mercurial Diuretics, The Pulmonary Coin Lesion, and a Special Exhibit on Fractures. In addition, there are many clear explanations of difficult specialized techniques such as angiography, the Treponema pallidum complement-fixation test, and various surgical procedures.

While the book adequately fulfills its objective, its quality does not match that of the previous (1955) volume. The general quality of the reproductions leaves much to be desired. However, when the book is considered in its entirety, the technical flaws do not detract from its value.

The Merck Manual of Diagnosis and Therapy. Editorial Board: Charles E. Lyght, M.D., editor, and others. Ninth edition. Cloth, thumb-indexed. $6.75. Pp. 1870, with 40 illustrations. Merck & Co., Inc., Rahway, N. J., 1956.

The Merck Manual, which was first published in 1899, is designed to provide the physician with a ready source of information in regard to diagnosis and treatment of disease. The ninth edition, though some 1,870 pages in length, retains the convenient pocket size of previous editions. The book is divided into three parts. The first part is devoted to a description of diseases and major symptoms. Each of its 20 sections relates to a particular disease group, anatomic region, or specialty. Each section contains its own index, as well as a list of appropriate prescriptions, and is conveniently located by the marginal thumbnail index. The second part of the book consists of eight sections, devoted to such practical considerations as routine immunological measures, clinical and bedside procedures, diets, and preoperative and postoperative treatment. A complete index forms the third part of the book. The wealth of information provided by this small book will be appreciated by medical students and interns, as well as by the busy practitioner.

Hospital in Action: The Story of the Michael Reese Medical Center. By Lucy Freeman. Cloth, $5. Pp. 302, with illustrations. Rand McNally & Company, P. O. Box 7600, Chicago 80, 1956.

Here is light reading that points up the scientific workings of a large metropolitan hospital in terms of broad human interest. The selected thoroughness of reporting and narrative lets the detail carry its own line of drama without use of artificial "literary" devices. Skillfully covering the mass complex of hospital life, faith, hope, and charity, the book abounds with anecdotes—most of them pointed, some not. Here a world within a world is covered: from "the frozen woman" (whose temperature dropped to 60.8 F) to the gangland murder victim (newspapers at first said the final death blow was dealt in his guarded hospital room); from the hospital founding, based on rich gold strikes, to research pioneering a pre-Salk effective poliomyelitis vaccine; from Mandel Clinic's hubbub of charity cases to a nurse's concern for the broken arm of a sobbing girl's doll. The author's selection of quotations, from doctors she interviewed at Michael Reese during her six months' "acquaintanceship" there, have impact in their conciseness. An internist: "In medicine you can't stand still. If you don't read [medical journals] you are not completely effective." A psychiatrist: "People feel less lonely and abandoned if they just know somebody is interested in them for themselves." In one Michael Reese hospital file is the report of a woman who telephoned, "I'd like to come in for arthritis today." The clinic worker replied, "I'm sorry but we don't have an arthritis clinic on Wednesday." The woman demanded, "Well, what *do* you have on Wednesdays?"

Analytical Pathology: Treatises in the Perspective of Biology, Chemistry, and Physics. Edited by Robert C. Mellors, M.D., Ph.D., Associate, Pathology Division, Sloan-Kettering Institute for Cancer Research, New York. Foreword by Eugene L. Opie, M.D., Sc.D. Cloth, $12. Pp. 477, with illustrations. Blakiston Division, McGraw-Hill Book Company, Inc., 330 W. 42nd St., New York 36; 95 Farringdon St., London, E.C.4, England, 1957.

This compilation provides comprehensive reviews dealing with cancer (Robert C. Mellors), arteriosclerosis and hypertension (John W. Gofman), glomerulonephritis (David B. Jones), hepatic failure (Oscar D. Ratnoff), pituitary disorders (Agnes B. Russfield), macrocytic anemias (Richard W. Vilter), abnormal hemoglobins (John J. Will), and hypersensitivity (Bernard M. Wagner). The wisdom of placing discussions of such widely diversified subjects in one volume may be questioned. Each section is presented fully and with an appropriate bibliography. Anyone interested in the subjects covered should find this volume useful.

QUERIES AND MINOR NOTES

USE OF STIMULANTS BY TRUCK DRIVERS

To the Editor:—*The Committee on Medical Aspects of Traffic Accidents of the Canadian Medical Association has been asked to advise the provincial authorities regarding the problem created by the use of Benzedrine tablets by long-haul truck drivers and others. Please supply such information.*

M.D., Canada.

Answer.—In New and Nonofficial Remedies it is pointed out that the use of Benzedrine to alleviate sleepiness and fatigue by persons not under medical control is to be condemned. The dangers lie in the elimination of the warning signal of fatigue in individuals who are overdoing, the possibility of habit-formation on continued use, and undesirable circulatory effects. Collapse has occurred in some such cases. Except when administered under the strict supervision of the physician, use of the drug is not recommended for developing a sense of exhilaration, increased energy, and capacity for work, nor as a "pick-me-up" after temporary alcoholic overindulgence.

MALIGNANCY IN POLYPOSIS

To the Editor:—*How does the incidence of malignancy in polyposis that is secondary to ulcerative colitis differ from that in single or multiple polyps in the relatively "silent" colon not affected with ulcerative colitis?*

C. D. J. Generales, M.D., New York.

This inquiry was referred to two consultants, whose respective replies follow.—Ed.

Answer.—The incidence of maligancy in so-called polyps secondary to ulcerative colitis is very small compared to the incidence of malignancy in the adenomatous polyps with single or multiple polyps in the large intestine. The former are mucosal tags, not true polyps. Malignant change does occur, but rarely and late in the course of ulcerative colitis. This change may occur in the mucous membrane where there are no apparent mucosal tags as well as in the mucosal tags themselves. Adenomatous polyps of the large intestine are potentially malignant conditions, and malignant changes are prone to occur in them if a long enough time elapses.

Answer.—Willis (Pathology of Tumours, St. Louis, C. V. Mosby Company, 1948) points out that "polyps" often mentioned in ulcerative colitis are usually not true neoplastic polyps but merely inflammatory polypoid projections of residual mucous membranes. In one series that included 800 patients with colitis (Brust and Bargen: *New England J. Med.* **210**:1692, 1934) there was a 2.5% incidence of carcinoma. Of 1,467 patients with chronic ulcerative colitis, 28 individuals later developed carcinoma (Lynn: *Internat. Abstr. Surg.* **81**:269, 1945; in *Surg. Gynec. & Obst.*, Oct., 1945). Willis found only one example in 30 autopsies of patients with ulcerative colitis.

According to Willis, all polyps of the large intestine (whether numerous, few, or single, and whether familial or not) are disposed to carcinomatous change, the predisposition being least in the solitary polypus and greatest in familial polyposis. Swinton and Warren (*J. A. M. A.* **113**:1927 [Nov. 25] 1939) concluded than an origin from polyps was demonstrable in 14% of 827 cases of colonic and rectal carcinoma. Ackerman and Regata estimate that 15 to 40% of cases of carcinoma of the large intestine arise from preexisting polyps. If the statistics are approached in a somewhat different fashion, the evidence of malignant change in papillary adenomas of the intestine has been given as 3.4% (Swinton and co-workers: *A. M. A. Arch. Int. Med.* **96**:544 [Oct.] 1955), 68% (Sunderland and Binkley: *Cancer* **1**:184, 1948), 10-20% (Ewing: *Ann. Roy. Coll. Surgeons England* **6**:413, 1950), and 22% (Welch and associates: *New England J. Med.* **247**:959, 1952).

MERCURY IN THE INTESTINE

To the Editor:—*A patient had temporary renal suppression (oliguria) postoperatively following a Miles operation (combined abdominoperineal resection of rectosigmoid with colostomy). A Cantor nasogastroenteric tube had been inserted preoperatively, with the tip in the terminal ileum. Postoperatively, the Cantor tube was withdrawn, but in the process the balloon carrying the liquid mercury burst and the mercury has become disseminated through the intestine. While such mercury is often thought to be inert physiologically, is there any danger of poisoning, especially in the form of nephrosis or nephritis, from the oxides or other mercurial products that might exist in the intestine? This particular patient also had 1,500 cc. of whole citrated blood given by transfusion during surgery. The urine turned orange and there was associated hypotension about 18 hours postoperatively. Fortunately, the oliguria did not last long, and recovery has followed. Could the mercury be considered a possible factor in the renal suppression in this case? Are there any references to toxic states resulting from liquid mercury?*

M.D., Wisconsin.

This inquiry was referred to two consultants, whose respective replies follow.—Ed.

Answer.—There are reported in the literature a number of cases where similar accidents occurred and mercury was disseminated through the intestine. Can-

The answers here published have been prepared by competent authorities. They do not, however, represent the opinions of any medical or other organization unless specifically so stated in the reply. Anonymous communications and queries on postal cards cannot be answered. Every letter must contain the writer's name and address, but these will be omitted on request.

tor, in reporting a case with some unusual aspects, reviewed the literature on this subject (*J. A. M. A.* **146**:560 [June 9] 1951). Although elemental mercury may even become finely dispersed throughout the intestinal tract, there is no evidence that absorption occurs. Local irritation with tissue foreign body reaction has been reported in those instances where the mercury had become trapped, as for example in the appendix, but never any toxic effects from absorption. It is, therefore, unlikely that the escape of mercury into the intestinal tract in this case had anything to do with the suppression of urine. It is quite possible that the oliguria could have resulted from a transfusion reaction.

ANSWER.—In generations long past, a common method of treatment of obstipation was the administration of gross amounts of metallic mercury, up to 1 lb. On opening burial sites of colonists along the Atlantic coast, occasionally a pool of mercury may be found indicating this practice. It does not follow that such disclosure indicates death from mercury poisoning. Commonly, no mercury poisoning followed this practice, but on occasion stomatitis, tremors, and other manifestations did arise. When administered by mouth, not all mercury may leave the body in fecal material earlier than 14 days. X-ray examination may indicate the extent of retention of mercury along the intestinal tract. It is not known that compounds of mercury readily are produced in the intestines. When the mercury is introduced into the lower intestines, absorption is less likely than when it is introduced into the stomach and upper intestines. An attempted suicide by intravenous injection of metallic mercury is quoted by Leschke, 2 cc. (27 gm.) being injected into the right cubital vein. There were no symptoms for three days; then there were moderate subacute mercurial symptoms, which subsided completely. X-ray examination showed mercury globules through the base of the lungs and in a pool in the apex of the right side of the heart. The patient survived 10 years in good health, except for occasional diarrhea. It is unlikely that the mentioned oliguria derived from the implanted mercury. Although nephritis is frequent in acute mercury poisoning, it is not known that nephritis or nephrosis has been produced by metallic mercury located within the intestinal tract.

POLYPLOIDY IN MAN

TO THE EDITOR:—*Since colchicine causes polyploidy in plants and animals, it seems theoretically possible that when colchicine was widely used for the treatment of gout polyploid strains of man might have been induced. Is anything known about polyploidy in man induced by colchicine or other agents?*

Kurt Wiener, M.D., Milwaukee.

This inquiry was referred to three consultants, whose respective replies follow.—ED.

ANSWER.—There is no known induction of polyploidy in man after the administration of colchicine or other agents. Theoretically, it is extremely unlikely that, in the treatment of gout, the oral administration of relatively nontoxic doses of colchicine would cause the induction of polyploidy in gametes. Orally administered colchicine is largely and rapidly excreted. Concerning colchicine distribution in the mouse, the available evidence (Back and co-workers: *Proc. Soc. Exper. Biol. & Med.* **77**:667, 1951) indicates that the genitalia do not receive or retain any appreciable quantity of an administered dose. In addition, even if the ovary or testes did accumulate appreciable amounts of the drug, the production of viable polyploid gametes under such conditions would be improbable.

ANSWER.—Nothing is known directly about polyploidy in man induced by colchicine or other mutagenic agents. If anything significant could have resulted from mutagenic action of radiation, colchicine, or other chemicals or forms of energy, it might be expected to be reflected in an increasing incidence of stillbirths, monsters, or inheritable defects. While statistics of this sort are difficult to obtain with any sort of precision, there appears to be no tendency toward an increased incidence of abnormalities, so that one may conclude that so far mutagenic agents have had relatively little significant effect on human genetics, at least during the recent short interval of time in which these matters have been under study.

ANSWER.—Polyploidy and mutations have been induced in plants by the use of colchicine in order to modify their genetic pattern. No such effects have ever been induced in the human and indeed are unlikely because of the relatively small doses tolerated by man as compared to those applied to the plant.

EXPOSURE TO PHTHALIC ANHYDRIDE

TO THE EDITOR:—*A 45-year-old white man has been exposed to fumes of phthalic anhydride or some substance involved in its manufacture. He has dyspnea, wheezing respirations, epistaxis, and "black-outs." These symptoms have been partially controlled by ephedrine or prednisone, but all symptoms recur when medication is stopped. Physical examination is normal except for expiratory wheezes throughout both lung fields. His vital capacity is 2,500 cc. (normal—4,400 cc.). Chest x-ray, blood cell count, routine urinalysis, and electrocardiogram are all within normal limits. Please provide information concerning toxic effects on the respiratory tract of of phthalic anhydride or other volatile substances involved in its manufacture.*

Charles Silverberg, M.D., St. Louis.

ANSWER.—The starting material for the manufacture of phthalic anhydride may be naphthalene; as intermediates, maleic anhydride and naphthoquinone may appear. However, phthalic anhydride itself is the more likely offender if the described condition is of occupational origin. This substance is a direct irritant to mucous membranes and skin and, more important, serves as a ready sensitizer. Typical clinical findings include inflammation of the upper respiratory tract, atrophy of the nasal mucous membrane, blood-stained nasal discharges, total or partial loss of the sense of smell, hoarseness, and bronchitis. In long-standing

cases, emphysema may appear. Episodes of paroxysmal asthma are frequent. A maximum acceptable concentration of 0.025 mg. per liter has been proposed. When brown staining of the skin has appeared, this has been attributed to naphthoquinone. It would appear that the description in the query is consonant with the characteristic findings encountered from exposure to phthalic anhydride. Additional information may be located in *Public Health Engineering Abstracts* (35:9, 1955).

CABBAGE JUICE

To the Editor:—*Several patients who have suffered from intractable digestive complaints have been treated with diet, hygiene, antispasmodics, antacids, and, more recently, the tranquilizers, with only temporary relief. Most of them have had complete studies at good clinics and have been relegated to the diagnostic catch-all, psychoneurosis. All of these patients have tried drinking cabbage juice and have become symptom-free. One such patient was an elderly man, who had had to take medicine for his gastric complaints since he was a child and who had no obvious emotional problems that could contribute to his condition. Five years ago he had to remain out of work because of severe pain and frequent vomiting. He became emaciated and very depressed. He then tried cabbage juice and was able to return to work in a few days, after having been home about two months. Since this time he has had a great many emotional difficulties—he lost his job, his wife became a helpless schizophrenic, and he had financial reverses—but he has not had to take any kind of medicine, has been able to eat as he pleased, and has remained symptom-free, although he only took the cabbage juice for two weeks, five years ago. Several patients have told similar stories. These patients are all sensible and well-educated people who began treating themselves out of desperation, having no faith that they would be helped. They were surprised and enthusiastic when they were helped. Is there any explanation for this?*

Harland N. Hannon, M.D., North Grafton, Mass.

This inquiry was referred to two consultants, whose respective replies follow.—Ed.

Answer.—Reports such as this are received from time to time about a variety of vegetable juices as well as cabbage juice. In fact, individuals speak about relief from vague digestive disorders due to the omission of certain foods even more frequently than from the addition of something like a vegetable juice or a fruit juice. There does not seem to be any logical, or at least a scientific, explanation of the marked change in the digestive symptoms that sometimes comes from drinking these juices. It could be coincidental, but such an opinion would be difficult to substantiate in view of the striking and rather dramatic relief obtained by some individuals. As long as the treatment is so entirely harmless, why not continue it in these selected individuals?

Answer.—Almost everyone with a fairly long experience in private practice has seen patients with digestive complaints both with and without substantiating evidence of intrinsic disease per se of the gastrointestinal tract apparently respond to the most bizarre types of therapy. Response is improved when the therapist himself believes strongly in the effectiveness of the therapy. In this instance it is cabbage juice. Fresh cabbage juice is a good source of ascorbic acid, and, if the digestive complaints were on this basis, which does not seem likely from the query, one might expect dramatic improvement. There are traces of other vitamins in cabbage juice, but a deficiency of these would seem even more remote. The traces of other nutrients could be supplied by these foods. One must conclude at the present time that there is no known substance in cabbage juice adequate to explain the results.

EDUCATIONAL TRAINING FOR PATIENT WITH CHOREA

To the Editor:—*A 17-year-old boy is suffering from chorea (St. Vitus' dance). He has made good average grades in high school and is finishing this year. He is interested in radar, and his parents are anxious for him to continue with university training. When he is under much tension, his penmanship becomes illegible. Is it advisable for him to go on to the university? Are there schools for individuals with this sort of handicap that give specialized training?*

Alfred H. Hathock, M.D., Fayetteville, Ark.

Answer.—If this boy has Sydenham's chorea, there is no reason why he should not make whatever plans he desires regarding his future schooling and career. He will recover from this type of chorea, although he may develop a recurrence. He is old for a first episode of chorea. If he has another form of chorea, such as chronic progressive (Huntington's) chorea, his choreiform movements will become worse and will be associated with intellectual deterioration. The appearance of the latter varies and may be delayed for some time after the appearance of the chorea, or it may develop early. Even if this patient has chronic progressive chorea, if he has a good intellect there is no reason why he should not be given whatever training he can master, to be used for as long as he can use it. One of the large rehabilitation centers may be able to provide him with special training.

EXPOSURE TO TOLUIDINE

To the Editor:—*On two occasions a young man was exposed to a mixture of toluidine and methanol in the course of his work. He exhibited a weakness and cyanosis at these times. Please provide some information as to the toxicity of these substances and advice as to treatment and prevention of further attacks.*

T. J. Conley, M.D., Park Ridge, Ill.

Answer.—In this instance there is little reason to consider methanol as the offender. Industrial exposure to methanol almost never leads to injury beyond dermatitis. Not so toluidine, which is an active systemic poison. Chemically, this substance is closely related to ani-

line oil, the symptomatology and pathology connected with the two agents being similar, although toluidine may be more active in relation to the genitourinary tract and as a cancerogen. There are several toluidines, such as metatoluidine, paratoluidine, and orthotoluidine. The toxicity for these different forms varies somewhat, but for immediate purposes they are considered as a unity. Poisoning may be brought about through inhalation of vapors, skin absorption, and oral intake. The chief manifestations are related to anoxia following methemoglobin formation: cyanosis, headache, weakness, dyspnea, convulsions, mental disturbances, increased salivation, vomiting, diarrhea, hypothermia, hematuria, anuria, diminution in the number of red blood cells, lowered blood pressure, and icterus. The mention in the query of cyanosis and weakness suggests toluidine involvement. It has been reported that intake of ethyl alcohol at the time of exposure to toluidine accentuates the methemoglobinemia. It is not known that this is true in the case of methanol. Without further evidence, warrant exists for the prompt reduction of the exposure to toluidine. In the presence of an acute episode such as mentioned, the cyanosis may be treated by oxygen therapy. Diuretics favor the elimination of toluidine. In the presence of skin contact, prompt cleansing of the skin is recommended, through the free use of weak acetic acid such as vinegar. Reduction of exposure is the fundamental requisite.

TREATMENT OF DISGERMINOMA

To the Editor:—*A 19-year-old girl underwent operation recently for a tumor mass, and a large, orange-sized, well-encapsulated disgerminoma of the right ovary was found. It was attached by a long pedicle, which made removal quite easy. A careful and meticulous examination of all of the other pelvic organs, the peritoneum, the mesentery, and the abdominal organs revealed no evidence of metastasis. The other ovary appeared normal; biopsy showed it to be quite normal. Due to the fact that the other organs looked so normal, they were not disturbed. The patient had a normal convalescence. She has a normal menstrual function and is in excellent physical condition; there is no evidence of pseudohermaphroditism. There seems to be a difference of opinion in the literature as to how tumors of this type should be treated. One school of thought is that the patient should have all her genital organs removed and that this should be followed by deep x-ray therapy. Others state that the removal of the mass is all that is indicated. Certainly, a radical extirpation of this unmarried girl's reproductive organs, with or without deep x-ray therapy, would be a great crippling procedure, but she should certainly receive the benefit of modern therapy. Please provide consultation and advice.*

V. D. Goodall, M.D., Clifton, Texas.

Answer.—Disgerminoma of the ovary must be considered a malignant tumor. The gradation of malignancy, however, is very wide, and this case falls into the classification of tumor with intact capsule and no extension beyond the ovary. This group offers a favorable prognosis, and it is in this group that removal of the single adnexa alone has been most successful in curing the patient. The fact that this patient has normal menstrual function and is in excellent physical condition with no evidence of pseudohermaphroditism is important. There are a number of reports in the literature of patients in this group who have borne children after successful operation. In a patient of this age with clinical and operative findings as described the prognosis should be good, and it is advised that no radical procedure or radiation therapy be carried out but that she be followed at close intervals, with the fact that the possibility of recurrence still exists borne in mind.

DIOCTYL SODIUM SULFOSUCCINATE

To the Editor:—*Does dioctyl sodium sulfosuccinate (Doxinate) in therapeutic doses produce excessive drying of the mucous membranes of the oral cavity?*

M.D., Virginia.

Answer.—There is no information to indicate that therapeutic doses of dioctyl sodium sulfosuccinate are likely to produce dryness of the mucous membranes of the oral cavity. No mention of such an effect is made in the clinical report of Wilson and Dickinson (*J. A. M. A.* **158**:261 [May 28] 1955) or in the New and Nonofficial Remedies monograph on the drug (*J. A. M. A.* **161**:65 [May 5] 1956). Since this surface-active agent is relatively inert pharmacologically, when administered orally one would not expect it to have any drying effect on the oral mucous membrane as a result of systemic action. If such an effect were possible as a result of local action because the solution form of the drug had been employed, it presumably could be obviated by the use of the capsule form of dioctyl sodium sulfosuccinate.

REMOVAL OF STAINS ON TEETH

To the Editor:—*Is there any combination of chemicals that can loosen or remove the brown stains on teeth caused by tobacco tars without being injurious to the teeth or mouth? Does the tar unite with tooth enamel?*

M.D., Florida.

Answer.—Despite the appearance of several drug preparations for the removal of dental calculus (tartar) and stains, there appears to be no effective material that may be used without real or potential hazard to the enamel surface. Some of the agents offered in the past consisted of acid solutions, which decalcified significant portions of the tooth. Recently, chelating agents have been incorporated in a preparation marketed for calculus removal. The fundamental nature of the tobacco-staining mechanism has not been studied extensively, and there is no evidence to indicate that the pigments enter into physicochemical combination with the apatite structure of the dental enamel. On the basis of available information (Vallotton: *J. Dent. Res.* **24**:161-187, 1945) it would appear more likely that the tobacco tars are incorporated into the proteinaceous plaque or film that collects on and adheres to the tooth surface.

Stains on the teeth may be removed most reliably by the methods employed in prophylaxis at the hands of a dentist or qualified dental hygienist. The abrasives commonly used in these procedures are selected and applied with due regard for the preservation of the tooth tissue. Recurrence of objectionable stain between treatments may be delayed or prevented by proper oral hygiene. A more highly abrasive dentifrice may be recommended in some cases by the dentist. Frequently, the dentist may prescribe occasional rubbing of the susceptible tooth surfaces with an orangewood stick dipped in the dentifrice. This procedure should not be adopted without consultation, however, since its prolonged or promiscuous practice may abrade the enamel. The recent developments in cigarette filters and filtered cigarette holders may be of some practical significance in this connection.

IODINE-FREE X-RAY MEDIUMS

To the Editor:—*Is there any medium that can be used for x-ray of the gallbladder that does not contain iodine?*

William V. Glenn, M.D., Falls City, Neb.

Answer.—Tetrabromophenolphthalein (Tetrabromophthalein) sodium is the compound that Graham and Cole first used to visualize the gallbladder. While good visualization of the gallbladder was secured with this substance, it was subsequently found that the substitution of iodine for bromine produced better contrast. There may, however, be certain indications for the use of tetrabromophenolphthalein, particularly if the patient is sensitive to iodine. However, it is understood that the tetrabromophenolphthalein sodium is no longer manufactured. Previous manufacturers included the Mallinckrodt Chemical Works and the Eastman Kodak Company. A discussion of this diagnostic agent has also been omitted from New and Nonofficial Remedies.

BLOOD OXYGEN AND BLOOD FLOW DURING FLIGHT

To the Editor:—*To what extent is the oxygenation of the blood and the flow to the coronary and cerebral vessels diminished by flying in a nonpressurized cabin above 5,000 ft.? To what extent is the judgment of a pilot impaired by flying at higher altitudes? What is the maximum number of hours per month that he could safely fly above 5,000 ft. without permanent or temporary damage to his general health?*

Carl J. Elward, M.D., Wabash, Ind.

Answer.—Significant decreases in blood oxygen saturation do not occur below 10,000 ft. This is due to the rather "flat" shape of the oxygen-hemoglobin dissociation curve with oxygen tensions from 100 to 60 mm. Hg. Above 10,000 ft. there is progressive impairment of function, with unconsciousness occurring after about 5 minutes' exposure at 25,000 ft. in the average individual. It is to be emphasized that there is much individual variation in these values. Coronary flow is not diminished by hypoxia; quite the opposite is true. The myocardium is protected from oxygen lack by increasing coronary flow as the blood oxygen saturation decreases. Cerebral flow increases with hypoxia; however, the concomitant hyperventilation and respiratory alkalosis tend to produce cerebral vasoconstriction and diminution of flow.

There is no limit to the number of hours that may be flown per month at between 5,000 and 10,000 ft. However, to alleviate fatigue, it is suggested that, when a pilot is above 8,000 ft. for more than a few hours, oxygen be used; above 10,000 ft., oxygen (with the proper type of mask and regulator) must be used. In addition, during night flights, oxygen should be used at above 5,000 ft., since night vision is particularly susceptible to impairment from slight degrees of hypoxia.

GRANULOMATOUS INFLAMMATION OF THE EYE

To the Editor:—*A 16-year-old girl, who has always been in good health, suddenly developed a granulomatous exudate on the inner surface of the cornea. All routine examinations were normal, and the patient appeared to be perfectly healthy, but repeated serologic tests for syphilis were positive. The Kolmer quantitative test was positive at a dilution of 1:64. The spinal fluid gave negative Kolmer and negative colloidal gold reactions. The Treponema pallidum immobilization test was positive. There is no history of syphilis on the part of either parent, and a serologic test for syphilis is negative for both parents. Since these findings were made, the patient has received 2 million units of procaine penicillin G in aqueous suspension daily for 10 days, reinforced with 1 Gm. of probenecid and 400,000 units of potassium penicillin G every six hours. After this she received 1 Gm. of chlortetracycline hydrochloride daily for three months. She has also received 16 injections of bismuth. There has been no improvement in the eye at all. Is it to be considered that some other source than the syphilis is the cause of the granulomatous exudate? If not, what further treatment of the lesion should be carried out?*

M.D., Kansas.

This inquiry has been been referred to two consultants, whose respective replies follow.—Ed.

Answer.—The high titered reactions with the Kolmer complement-fixation test and the positive T. pallidum immobilization test indicate that this patient probably has or has had a syphilitic infection. The serum of the patient should be sent to several laboratories for examination with the T. pallidum immobilization test and other specific procedures employing treponemal antigens, such as the T. pallidum immune adherence and complement-fixation tests. The results of these examinations would shed valuable light as to the validity of the T. pallidum immobilization test result originally obtained. The negative serologic status of both parents, especially the mother, tends to exclude the possibility of a prenatal infection. The failure of the lesion to respond to the specific therapy administered should make one consider some other source than syphilis as

the cause of the granulomatous lesion. Histopathological examination of the lesion and consultation with an ophthalmologist are indicated prior to institution of any further treatment.

ANSWER.—There are a number of causes of granulomatous inflammation of the eye. In this patient, since there has been no improvement with antisyphilitic therapy, it must be assumed that syphilis is not an etiological factor in the disease. Granulomatous uveitis is considered to be caused by a bacterial type of hypersensitivity of the eye and may be caused by many different organisms. Among the usual diseases excluded in a routine study of granulomatous uveitis are tuberculosis, syphilis, sarcoidosis, toxoplasmosis, brucellosis, various fungus diseases, virus diseases, and sympathetic ophthalmia. The following studies are suggested: compete blood cell count, urinalysis, testing for C-reactive protein, and determination of the sedimentation rate and of the levels of proteins and uric acid in the plasma. Agglutination tests for brucellosis are indicated, as are the complement-fixation test for histoplasmosis (if the skin test is positive) and dye tests for toxoplasmosis. Skin tests usually performed include tuberculin, brucellergen, toxoplasmosis, coccidiosis, and histoplasmosis tests. Chest x-ray examination may be helpful. It must be emphasized that Koch's law cannot be applied in the case of ocular inflammations, and the etiological diagnosis must be based solely on indirect evidence. The subject has been discussed recently by Woods (Endogenous Uveitis, Baltimore, Williams & Wilkins Company, 1956).

MULTIPLE IMMUNIZATIONS

TO THE EDITOR:—*The students at a school are required to be immunized against smallpox and typhoid fever. Immunization against tetanus and poliomyelitis is now being considered. Will there be any harmful effects if all these are given within a six-week period? Only the first two injections against tetanus and poliomyelitis would be given at this time.* *Emory R. Irvin, M.D., Blacksburg, Va.*

ANSWER.—It is very commendable to protect the students against these four diseases. However, until much more is known about the effect of spacing of doses on the degree and duration of poliomyelitis-vaccine-conferred immunity, it would doubtless be prudent to abide by the poliomyelitis vaccine immunization schedule evolved by Dr. Salk. For the most effective protection, there should be a time interval preferably of one month between the first two doses of poliomyelitis vaccine (1 cc. each) and preferably of seven months (or more) between the second and third doses. When the first two injections are timed too close together (less than three weeks), they act like a single dose and are, therefore, far less protective. Smallpox vaccination (or revaccination), three weekly doses of typhoid vaccine, and two monthly doses of tetanus toxoid could all be administered between the second and third doses of polio vaccine. The question is far less one of harmful reaction than one of adequate and prolonged protection. Therefore, spacing is very important.

SALICYLIC ACID AND BLOOD COAGULATION

TO THE EDITOR:—*Is there any evidence that salicylic acid affects the coagulation time or prothrombin level of the blood? Is there any justification or rationale in the use of salicylic acid as a preventive in chronic coronary disease?* *M.D., New York.*

ANSWER.—The occurrence of hemorrhagic tendencies after administration of salicylic acid has been known for many years (Binz, 1891). This has been attributed to several factors: (1) thrombocytopenia due to drug idiosyncrasy (Quick, 1944); (2) capillary damage and vascular dilatation (Ashworth, 1944); and (3) induced hypoprothrombinemia (Link and others, 1943; Meyer and Howard, 1943; Shapiro and others, 1943). The close relation of salicylic acid to Dicumarol was suggested by the observation that the latter may be degraded in the body to salicylic acid. The salicylic acid hypoprothrombinemia could be prevented by vitamin K. It was believed that salicylic acid produced changes in liver function, although these are not demonstrable by available liver-function tests. Although there is no universal agreement as to the mechanism of its action, it is now generally accepted that salicylic acid may prolong the prothrombin time (Quick, 1944). However, it is only one-twentieth as potent as Dicumarol. Usually 3 to 5 Gm. daily is required to produce a change in prothrombin time, although an effect has been observed with doses as low as 1.3 Gm. daily. Also of interest is the observation that administration of aspirin and sulfonamides may further lower the prothrombin level of patients receiving Dicumarol. The effects of salicylic acid and Dicumarol are similar in that each must be administered for a period of time before an effect on prothrombin level is noted. However, in the case of aspirin a normal prothrombin level may return after several days or weeks of treatment despite elevated aspirin levels in the blood.

Because of its mild anticoagulant properties and minimal toxicity, an attempt has been made to administer aspirin prophylactically over long periods of time to prevent vascular thrombosis. In one such study (Craven, 1956), 8,000 male patients between 40 and 65 years of age received 0.3 to 0.6 Gm. daily over a period of several years with "not one case of detectable coronary or cerebral thrombosis." However, this clinical study was not scientifically controlled, and the results must be viewed with caution and skepticism. Since there is no proof as yet that routine administration of anticoagulants to all ambulatory patients with coronary artery disease will prevent coronary thrombosis and myocardial infarction, their use should be confined to selected patients with well-defined clinical indications. Furthermore, an accurate check must be kept on the blood prothrombin levels. Although aspirin is considered an innocuous drug, its indiscriminate use in large doses has often produced gastritis, gastric hemorrhage, and other hemorrhagic tendencies (Muir and Cossar, 1955). The use of smaller doses may have no appreciable effect on the prothrombin level or a very erratic one and would give a false sense of security. Therefore, the routine prolonged use of salicylic acid for this purpose is not recommended at present.

THIRD INJECTION OF POLIOMYELITIS VACCINE

To the Editor:—*In cases where the third injection of poliomyelitis vaccine is due during the winter months (seven months having passed since the second injection), is it advisable to delay the third injection until the spring so that the maximum booster effect will be present during the height of the poliomyelitis season?* *M.D., New Jersey.*

Answer.—Since the booster inoculation is recommended for long-term immunity, there is no need to be concerned about the few months intervening between winter and spring; antibody induced by poliomyelitis vaccine is not evanescent, and there are indications that immunity to paralysis is mediated through the action of immunological hyperreactivity that appears to persist, although the full duration has not yet been established. For further discussion, see articles by Salk (*Am. J. M. Sc.* **232**:369, 1956; *J. A. M. A.* **162**:1451-1459 [Dec. 15] 1956).

ESTROGENS AND CERVICAL CARCINOMA

To the Editor:—*Is a carcinoma, localized in any type of cervical tissue, a contraindication for the use of estrogens? What effect is there, if any, of estrogens on existing cancer of the cervix? What is the effect of estrogens in healthy cervical tissues?*

A. J. Becker, M.D., Mount Pleasant, Pa.

Answer.—Cancer of the uterus is thought by many to be an estrogen-dependent disease. Therefore, the presence of carcinoma in the cervix would contraindicate its use (Netter and others: *Compt. rend. Soc. franç. gynéc.* **25**:175, 1955). Estrogens given over prolonged periods have caused increased growth activity in some cervical carcinomas. This is noted especially in carcinoma of the cervix complicating pregnancy in the last trimester or in the immediate postpartum period (Smith: *J. Obst. & Gynec.*, to be published). Estrogens produce basal cell hyperactivity in the healthy cervix, and atypia and edema are also found (Hellman and others: *Am. J. Obst. & Gynec.* **67**:899, 1954).

TREMOR OF THE ARM

To the Editor:—*A 32-year-old man who has always been active and who at no time has had any injury has been having a tremor of his right arm when he lifts up any object. All laboratory findings are negative and all reflexes normal, and, in general, his physical examination is negative. Is there anything one can do for such a condition, and what is the diagnosis?*

Bernard Zuckerman, M.D., Milford, Conn.

Answer.—Tremors of the type described may be either organic or psychogenic in etiology. The manifestation, if recent in origin, may be the first symptom of multiple sclerosis, a cerebellar disorder, or hepatolenticular degeneration; the tremor may be a so-called essential or familial one; the difficulty may be entirely emotionally or psychologically precipitated. It would not be possible to arrive at a diagnosis without more information about the patient and the symptom. Most organic tremors, especially the so-called essential ones, are aggravated by emotion or tension. It is difficult to suggest therapy, but it should be said that intention or action tremors generally do not respond to drugs such as scopolamine and trihexyphenidyl (Artane), which are often of help in relieving the tremors of Parkinsonism. On occasion the tranquilizing drugs, such as meprobamate, and the muscle relaxants, such as zoxazolamine (Flexin), are of some value in both essential (familial) and psychogenic tremors.

ULTRASONIC ENERGY OVER THE HEART AREA

To the Editor:—*Is there any contraindication to applying ultrasonic waves to the heart? If there is pathology overlying the heart that would be benefited by treatment with ultrasonic energy, would it be dangerous to direct this energy through the area of pathology and into the heart?*

Ellis V. Browning, M.D., Springerville, Ariz.

Answer.—Heating by ultrasonic energy occurs because of dissipation of heat at interfaces between various layers of tissue. It is possible that the heart with its covering of pericardium may be excessively heated if ultrasonic energy is applied to the precordial region. Therefore, in light of our present knowledge, it is to be recommended that ultrasonic energy be applied with extreme caution to the cardiac area, particularly if there is any history of cardiac disease.

NASAL VOICE AFTER TONSILLECTOMY

To the Editor:—*With reference to the query on nasal voice after tonsillectomy in* The Journal *for Jan. 26, 1957, page 327, it seems to me a very important factor was not mentioned, namely, the rhinolalia aperta that is due to the sudden removal of large obstructing adenoids, which leaves an unaccustomed large cavity. The soft palate is not adjusted at first, which accounts for the nasal voice. Later, as the palatal muscles become adjusted, the voice becomes more normal. Of course, there are cases where the scarring in the amygdaloid fossas often results in a shortening of the pillars, which hampers the action of the palate. This condition, however, does not manifest itself until months later.*

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To the Editor:—*In regard to the query on nasal voice after tonsillectomy and adenoidectomy in the Jan. 26, 1957, issue of* The Journal, *page 327, I feel that the most common and simplest explanation was omitted. The infant or young child with a nasopharynx full of lymphoid tissue has no occasion to use the free edge of the soft palate. When the adenoid mass is removed, even though the palate is not scarred, the palate hangs flaccid and useless*

until it is reeducated. This can be demonstrated by having the child phonate while the examiner strokes the palate with a cotton applicator just enough to cause some elevation; it will be seen that the nasal "twang" immediately disappears. Speech therapy is then the answer for a permanent cure, although most children will soon overcome the condition without therapy of any kind.

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To the Editor:—*I would like to add some remarks to the answer to the query on nasal voice after tonsillectomy and adenoidectomy in* The Journal *for Jan. 26, 1957, page 327. There are two main forms of "nasal voice" that should be distinguished. The one is characterized by the nasal quality that in English normally is heard only in the sounds m, n, and ng. In such cases all the voiced sounds, especially the vowels, carry with them this characteristic sound. This speech trouble is called hyperrhinolalia, or open nasality. It is caused by cleft palate, a hole in the palate, or weakness of the soft palate. The last-named condition may result from pains after adenoidectomy and/or tonsillectomy and may become habitual. Scar formations can also prevent the soft palate from rising and touching the posterior wall of the pharynx (as it should for all sounds in English except m, n, and ng). This so-called postoperative hyperrhinolalia may have existed before the operation but could have been "damped" by the adenoid tissue and so escaped the ears of the listener. (It could have been found by special logopedic methods.) In all cases of weakness of the soft palate a certain training is indicated (Pushing method).*

The other form of "nasality" is called hyporhinolalia, or closed nasality, and is, as a rule, due to some growths in the nasopharynx and/or the nose ("organic form"), those growths working as cushions that damp the voice vibrations in the nose, thus preventing the sounds m, n, and ng from receiving the full "nose resonance." Hyporhinolalia may also be due to a cramp-like contraction of the soft palate during speech ("functional form"). The treatment of the organic form consists of removal of the "cushions," while the functional form calls for special exercises aimed at relaxing the muscles of the velum.

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To the Editor:—*I should like to suggest to you another answer than the one submitted to the question concerning the nasal voice one month after a tonsillectomy and adenoidectomy (*The Journal, *Jan. 26, 1957, page 327) in a 5-year-old child. The statement is made that the nasal quality of the voice results from occlusion of the airway to the nasal passage, possibly by missed adenoids. Might this statement not be somewhat confused? By definition, a nasal quality to the voice should refer to an excessive amount of reverberation through the nasal airway chambers, resulting in excessive resonance of consonants that require a partial closing of the palate, particularly those such as the letters k, q, and x, which require almost complete closing of the soft palate.*

The suggestion was made that the posterior nares were possibly blocked. Mechanically, this would separate the nasal chambers from the air and voice passages, thereby removing the nasal quality of the voice. It has been my experience that, in approximately 40% of the children and perhaps 60% of adults in whom a tonsillectomy is done, there are some complaints concerning the action of the soft palate. This primarily takes the form of complaints about an excess nasal quality to the voice (which is just exactly opposite to the gutteral type of voice produced by a blockage of the passage by enlarged adenoids or by the filling of the passage with secretions due to a severe rhinorrhea) or that food particles and most noticeably ice cream get up behind the soft palate, which does not close properly. Observation of the fauces at this time will reveal normal function of the levator and the tensor muscles but will reveal the fact that the glossopalatinus and pharyngopalatinus muscles have been exposed by the removal of the tonsil and the closing of the mucous membranes and are swollen, exudative, and spastic. It is impossible in these instances for the soft palate to be elevated against this pulling down, swelling, and spacticity.

Usually in one month's time, and in 95% of the cases in two months' time, this phenomenon has disappeared. In the case cited, the probability is that by the time the parents were becoming concerned the condition had already righted itself. I have seen only one instance persist longer than six months and only one case made permanent as the result of scarring following a tonsillectomy done 50 years ago by an unknown method.

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The above comments were referred to the consultant who answered the original query, and his reply follows.—Ed.

To the Editor:—*The difficulty seems to be the definition of "nasal voice." The nasal occlusion resulting from a head cold is usually referred to as a "nasal voice," and the other condition is failure of the palate to close completely, resulting in the characteristic "rhinolalia aperta" of the cleft palate. Both of these were mentioned in the original answer, but apparently too briefly. The original query considered a child who had a tonsillectomy for an abundance of adenoid and enlarged tonsils. In that particular case, residual adenoid tissue against the choanas seemed to be the most logical etiology. In the absence of this, another possibility is allergic rhinitis. In other words, in the particular query under consideration defective palate, while understood to be a possible cause, was not given primary consideration in light of the history presented.*